Griffy Lake
Aquatic Vegetation Management Plan
2007 Update

Monroe County, Indiana

February 4, 2008

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Executive Summary

This report was created in order to update the Griffy Lake Aquatic Vegetation Management Plan (AVMP). The update serves as a tool to track changes in the vegetation community and make the necessary adjustments to the vegetation management action plan. Items covered include an updated problem statement, an update on the management history and goals, an update on water body uses, 2007 sampling results and discussion, a review of the 2007 vegetation controls, a review of vegetation management control options, and updates to the budget and action plans. The original Griffy Lake AVMP was completed in 2004 in response to the discovery of Brazilian elodea (*Egeria densa*). The goal of the original plan was the elimination of Brazilian elodea. This was the first public access lake in Indiana to contain this invasive species, so eradication of this species was a priority. Aquatic Control completed a survey in 2004 and found Brazilian elodea at 32.3% of sample sites. The nuisance exotic species Eurasian watermilfoil (*Myriophyllum spicatum*) and curlyleaf pondweed (*Potamogeton crispus*) were also found to be abundant in Griffy Lake. The Indiana Department of Natural Resources (IDNR) conducted a survey in 2005 that indicated that Brazilian elodea was continuing to spread throughout the lake. IDNR funded a whole lake fluridone treatment in 2006 as part of the original plan's recommendations. The 2006 treatments significantly reduced Brazilian elodea abundance to the point that no rooted Brazilian elodea was observed at any point in the 2006 season. However, Brazilian elodea stems were collected during late summer rake sampling. Due to the presence of these stems, and the importance of eradicating this species, an additional whole lake treatment was completed in 2007.

On April 10, 2007, IDNR conducted a Tier II survey that included 85 sampling points. Brazilian elodea was present at 2.4% of the sites. Curlyleaf pondweed was the only other exotic species collected and it was discovered at 23.5% of sites. A whole lake fluridone treatment, with a goal of maintaining a concentration above 5 ppb for 120 days, was initiated on May 1. Sonar formulations were adjusted in an attempt to overcome the dilution caused by potentially heavy spring rains. Granular Sonar PR (precision release) was applied at a rate of 18 ppb while 6 ppb of Sonar AS was also applied. Regular tests were completed to monitor the fluridone concentration. The heavy spring rains never occurred, so fluridone levels remained well above the 5.0 ppb target until July 27. A bump treatment was completed on August 3 in order to maintain the concentration. The final test indicated that 5.3 ppb was present in Griffy Lake 120 days after treatment. A Tier II survey consisting of 100 points was completed on August 21 and no Brazilian elodea was detected.

Even though Brazilian elodea was not detected during the summer that does not imply that it is officially eradicated. Future plant management should focus on detection of any remaining Brazilian elodea. This should include Tier II surveys in early May, early July, and early September. Each survey should include a minimum of 100 rake tosses. The estimated cost of completing three surveys with 100 points along with plan update is $8,700. If any Brazilian elodea is detected it should be immediately dealt with in order to prevent spread. If detected in rake sampling, a 5-acre area surrounding the detection site should be treated with 150 ppb of Sonar PR. This area should be sampled again 12

weeks after treatment with a minimum of 20 rake tosses along with a visual inspection. If needed, the estimated cost of this type of treatment is $30,000. It is highly unlikely, but if Brazilian elodea is detected during the spring sampling in multiple areas or in locations greater than 1-acre, then another whole lake treatment should be initiated immediately. Due to the importance placed on the eradication of Brazilian elodea, it is recommended that IDNR budget for these actions.

Eurasian watermilfoil and curlyleaf pondweed are two other invasive species that have reached nuisance levels in Griffy Lake. Due to their differences in reproduction it is unlikely that Eurasian watermilfoil will be abundant in 2008, but curlyleaf pondweed could potentially reach nuisance levels. Tier II sampling should be adequate to detect any areas of Eurasian watermilfoil. If Eurasian watermilfoil is detected it will likely be present at very low levels. The areas should be quickly treated with granular Renovate OTF herbicide (active ingredient: triclopyr). The estimated cost of this type of treatment is difficult to figure due to the likelihood that a reifestation of milfoil would be at a very low level. However, the typical cost treating milfoil with Renovate OTF is roughly $600/acre.

Early season treatment of curlyleaf pondweed should be initiated this season with low doses of Aquathol K herbicide (active ingredient: endothal). If initiated, a map detailing curlyleaf areas should be completed in early April. Treatment may be needed for up to three consecutive seasons in order to exhaust turion supplies. Up to 20 acres of curlyleaf may require treatment. The estimated cost of this treatment would be $5,000. The curlyleaf pondweed and potential Eurasian watermilfoil treatments would require funding from LARE and/or the City of Bloomington Parks Department.

The past two seasons of treatment have reduced the abundance of native vegetation. Chara (*Chara spp.)* was the only submersed species detected during the summer Tier II survey. Several species of pondweed will likely return next season. The presence of these species should be well documented with the intensive sampling. If diversity has not significantly improved by 2009 steps may be needed in order to re-introduce native vegetation.

Acknowledgements

Funding for the vegetation sampling, treatment, and the plan update was provided by the Indiana Department of Natural Resources (IDNR) Division of Fish and Wildlife. Aquatic Control Inc. and IDNR completed the field work, data processing, and map generation. Special thanks are given to Doug Keller, Dave Kittaka, Angela Sturdevant, and Debbie King with the Indiana Department of Natural Resources for their assistance and review of this plan. Special thanks are also given to Angie Smith and Steve Cotter with Bloomington Parks and Recreation for their assistance with this plan. Author of this report is Nathan Long of Aquatic Control. The author would like to acknowledge the valuable input from David Isaacs, Brian Isaacs, Brendan Hastie, Joey Leach, and Barbie Huber of Aquatic Control for their field assistance, map generation, review, and editing of this report.

Table of Contents

List of Figures

List of Tables

1.0 INTRODUCTION

This report was created in order to update the Griffy Lake Aquatic Vegetation Management Plan. The plan update was funded by the Indiana Department of Natural Resources. The update serves as a tool to track changes in the vegetation community and make the necessary adjustments to the vegetation management action plan. Items covered include an updated problem statement, an update on the management history and goals, an update on water body uses, 2007 sampling results, plant sampling discussion, a review of the 2007 vegetation controls, a review of vegetation management control options, and updates to the budget and action plans. Once reviewed and approved, the update should be included in the original vegetation management plan, following the 2006 update and prior to the appendix.

2.0 PROBLEM STATEMENT

Eurasian watermilfoil, Brazilian elodea, and curlyleaf pondweed are the primary nuisance submersed aquatic plant species in Griffy Lake. Curlyleaf pondweed and Eurasian watermilfoil are relatively prevalent throughout Indiana and have been present in Griffy Lake for at least twenty years. However, Brazilian elodea is very rare in Indiana. It was first identified in Griffy Lake in 2001, but no action was taken. Following a 2004 plant survey, completed by IDNR district fisheries biologist Dave Kittaka, it was agreed that action must be taken to prevent the further spread of this species. Brazilian elodea has been documented in only a few ponds in the southern half of the state. To our knowledge, Griffy Lake is the largest public body of water containing this exotic species in Indiana. Elimination of this species should be the primary goal for the Indiana Department of Natural Resources and citizens concerned with the well being of Griffy Lake. If left unchecked, this species could spread to other lakes in Indiana where it may displace native vegetation and ruin fisheries due to its ability to form dense monoculture plant beds.

3.0 MANAGEMENT HISTORY AND GOALS

The primary goal of the original plan was the elimination of Brazilian elodea. This was the first public access lake in Indiana to contain this invasive species, so eradication of this species was a priority. Aquatic Control completed a survey in 2004 and found Brazilian elodea at 32.3% of sample sites. The nuisance exotic species Eurasian watermilfoil and curlyleaf pondweed were also found to be abundant in Griffy Lake. The Indiana Department of Natural Resources (IDNR) conducted a survey in 2005 that indicated that Brazilian elodea was continuing to spread throughout the lake. IDNR funded a whole lake fluridone treatment in 2006 as part of the original plan's recommendations. The 2006 treatments significantly reduced Brazilian elodea abundance to the point that no rooted Brazilian elodea was observed at any point in the 2006 season. However, Brazilian elodea stems were collected during late summer rake sampling. Due to the presence of these stems, and the importance of eradicating this species, an additional whole lake treatment was completed in 2007.

4.0 WATERSHED AND WATER BODY CHARACTERISTICS

Griffy Lake is a 109-acre reservoir located in Monroe county one mile north of Bloomington, Indiana. The maximum depth of Griffy Lake is 31 feet near the dam and the average depth is 10 feet. Griffy Lake was built in 1924 in order to provide additional water supply to the city of Bloomington. The dam was raised to its present height in

1943. The city of Bloomington no longer uses Griffy Lake as a water supply reservoir. Griffy Lake and a large part of the watershed is owned by the city of Bloomington and managed by Bloomington Parks and Recreation. Griffy Lake's drainage basin encompasses 5,037 acres of land including the lake area. Of this total, approximately 1,200 acres are owned by the City of Bloomington (Jones et. al., 1984). The watershed is drained by Griffy Creek, which has three equally sized branches or forks. Presently, the North Fork watershed is fairly pristine, the Middle Fork is in the first stages of urbanization, and the South Fork is rapidly urbanizing (Commonwealth Biomonitoring, 2000). Public access, in the form of a boat ramp, is located in the southeast corner or upper end of the lake. This access site is managed by Bloomington Parks and Recreation. Boating is limited to electric motors only.

5.0 PRESENT WATER BODY USES

Griffy Lake and the immediate surroundings are owned by the city of Bloomington and managed by the Bloomington Parks and Recreation department. There are no permanent dwellings on the shoreline of Griffy Lake. Griffy Lake attracts numerous visitors from the Bloomington area. It is a very popular place for boating, fishing, picnicking, hiking, and environmental education. The fishery of Griffy Lake is managed by IDNR (no surveys since the original plan). Griffy Lake and the surrounding watershed have been studied for many years by students and faculty from nearby Indiana University. A great deal of focus has been placed on preserving and improving the lake's watershed. Nuisance vegetation has hampered fishing and boating activities especially since the establishment of Brazilian elodea. The area surrounding the boat ramp used to contain some of the thickest beds of Brazilian elodea. This area has accumulated a great deal of sediment that has decreased the average depth and provided excellent substrate for the propagation of submersed macrophytes. During summer months, dense beds of Brazilian elodea made this area virtually impassable with electric motors and made fishing from shore difficult. A more worrisome aspect of this area was the presence of the public boat ramp. Brazilian elodea can spread simply by removing a fragment and introducing it to a new water body. For this reason, the boat ramp was closed on June 7, 2005. The public boat launch was opened on May 5, 2007, with inspection being required when watercraft were removed.. All use restrictions were lifted beginning Memorial Day weekend, 2007. The restrictions were lifted since the treatments effectively eliminated any viable Brazilian elodea.

6.0 SAMPLING RESULTS

Griffy Lake was officially sampled twice during the 2007 season. IDNR surveyed the lake on April 10 and Aquatic Control on August 21. The Tier II survey method was used on both occasions (IDNR 2007). However, more sample points were used in the Griffy Lake surveys than recommended by the protocol. The number of sample sites was increased in order to increase the chances of detecting Brazilian elodea. In addition to the Tier II surveys, visual observations were made during application and fluridone residue monitoring.

6.1 Spring Survey

IDNR completed a Tier II survey on April 10, 2007 (Table 1). Plants were found growing to a maximum depth of 9.5 feet. Eighty-five sites were sampled and plants were

collected at 34 of those locations. Eight species were collected during the survey of which 6 were natives. Curlyleaf pondweed was the most abundant species occurring at 23.5% of sample sites (Figure 1). Chara was collected at 14.1% of sample sites ranking it second in abundance. Sago pondweed, common coontail, creeping water primrose, and water stargrass were the only other native species collected and were all found at relatively low levels. Brazilian elodea was collected at two sites and had a rake score of 1 at both locations. These sites are illustrated as blue dots in Figure 2. According to IDNR, the fragment collected closest to the boat ramp was nearly leafless with a brittle stem. The fragment collected west of the causeway was approximately 4.0 inches in length, brown, and brittle with most of its leaves in tact.

Table 1. Griffy Lake, Occurrence and Abundance of Submersed Aquatic Plants, April 10, 2007 (Data collected by IDNR).

Occurrence and Abundance of Submersed Aquatic Plants - Overall

Lake: Griffy Lake	Secchi(ft): 5.0	SE Mean species / site: 0.07
Date: 4/10/2007	Littoral sites with plants: 34	Mean natives / site: 0.22
Littoral Depth (ft): 9.5	Number of species: 8	SE Mean natives / site: 0.05
Littoral Sites: 82	Maximum species / site: 3	Species diversity: 0.67
Total Sites: 85	Mean species / site: 0.48	Native diversity: 0.57

Species	Frequency of Occurrence	Score Frequency 0	1	3	5	Dominance
Sago pondweed	3.5	96.5	3.5	0.0	0.0	0.7
Coontail	1.2	98.8	1.2	0.0	0.0	0.2
Chara	14.1	85.9	12.9	0.0	1.2	3.8
Creeping Water Primrose	1.2	98.8	1.2	0.0	0.0	0.2
Water Stargrass	1.2	98.8	1.2	0.0	0.0	0.2
Brizilian Elodea	2.4	97.6	2.4	0.0	0.0	0.5
Curlyleaf	23.5	76.5	18.8	4.7	0.0	6.6
Filamentous Algae	62.4					

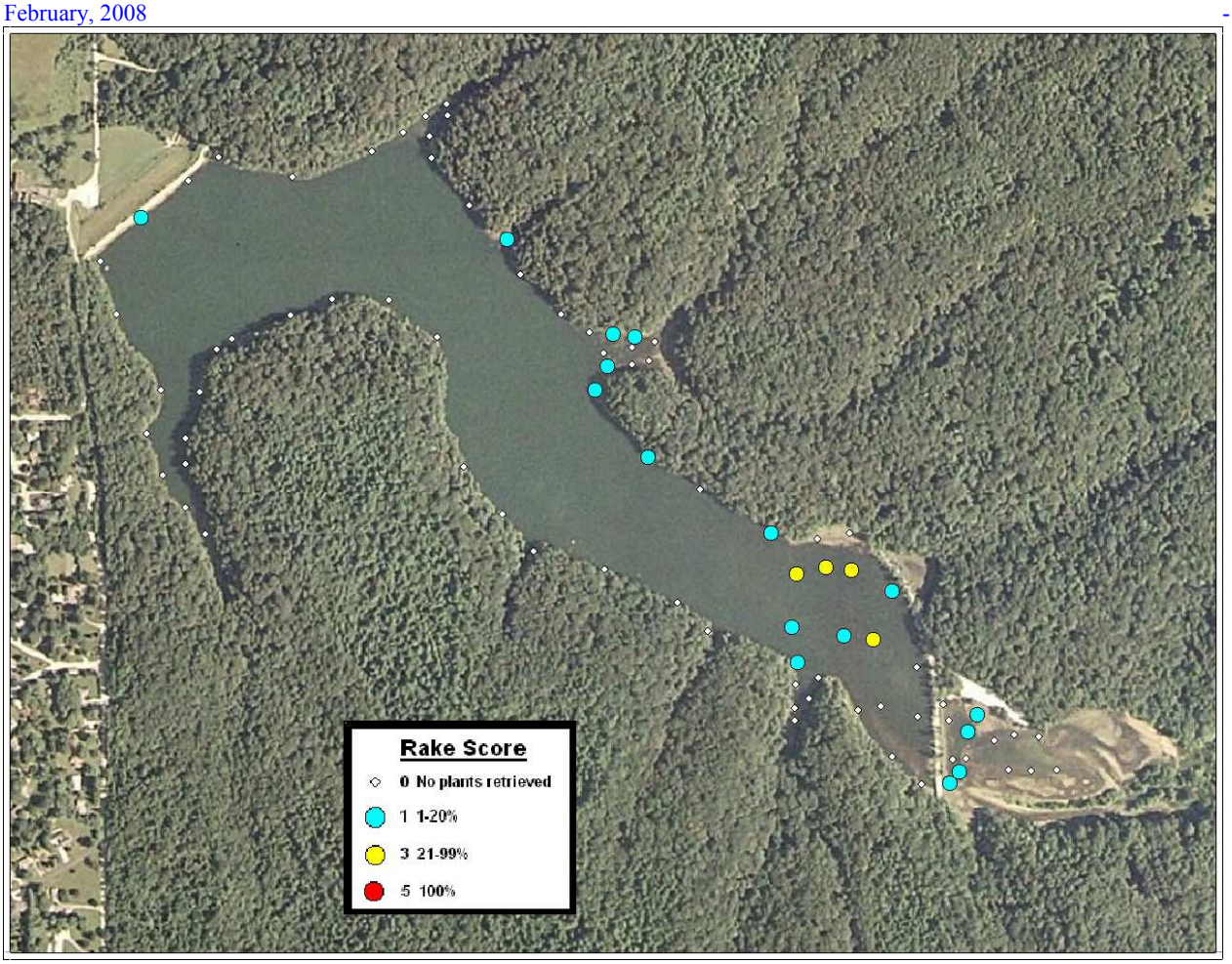

Figure 1. Griffy Lake, location of curlyleaf pondweed, April 10, 2007.

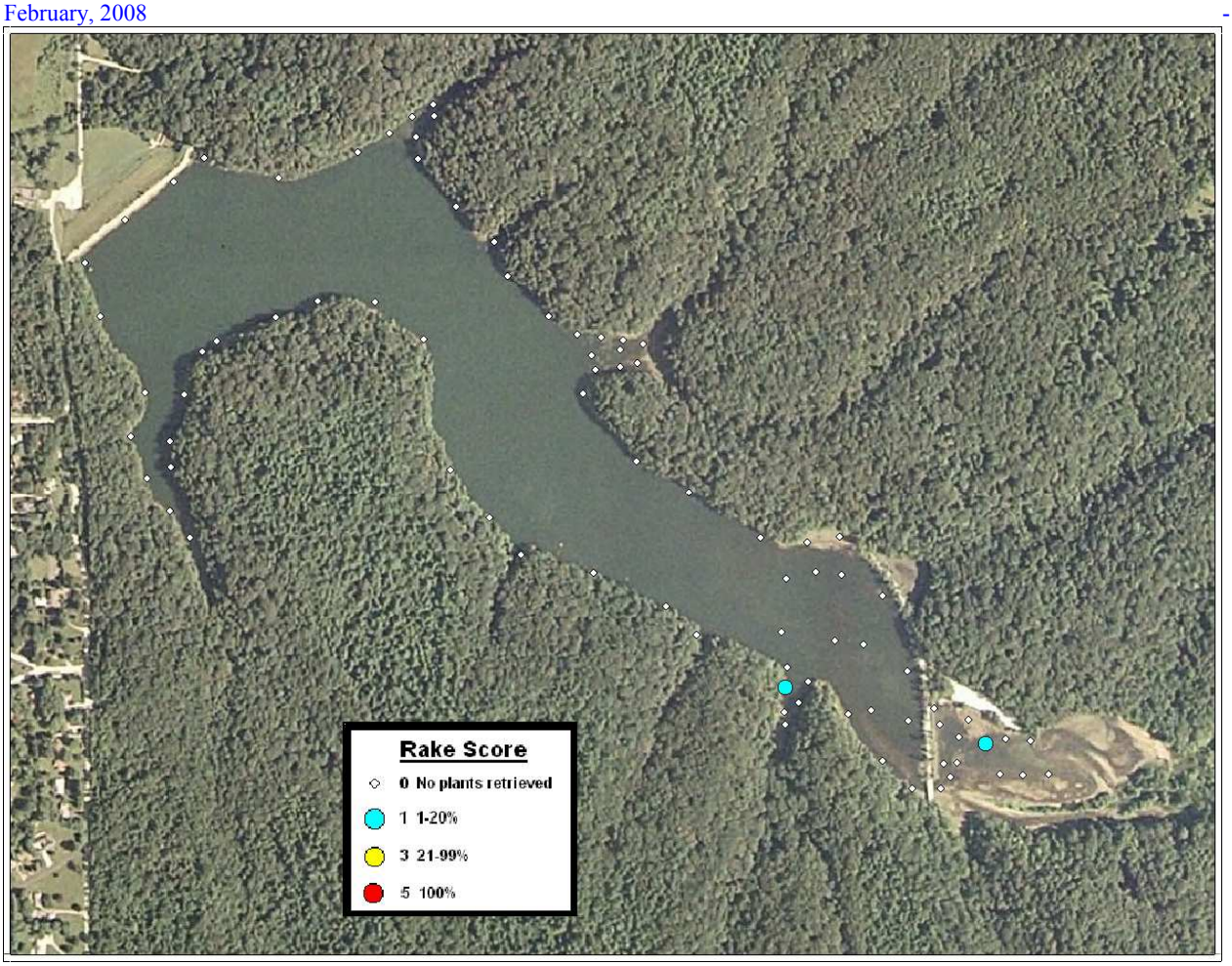

Figure 2. Griffy Lake, location of Brazilian elodea, April 10, 2007 (Brazilian elodea in blue).

6.2 Reconnaissance Surveys

A whole lake fluridone treatment was initiated on May 1, 2007. Informal reconnaissance surveys were completed throughout the season in order to monitor the effects of the treatment and document any presence of Brazilian elodea. These surveys were completed on seven different occasions during fluridone residue monitoring. Much like 2006, Brazilian elodea was never observed rooted or actively growing during the 2007 season. In addition, no Brazilian elodea stems or fragments were observed.

6.3 Summer Survey

Aquatic Control completed a Tier II survey on August 21, 2007. This survey was completed in order to document changes in the plant community caused by the on-going whole lake fluridone treatment, locate any remaining Brazilian elodea plants, and to assist in planning for the 2008 season. The number of sample points was increased to 100 in order to increase the chances of finding any remaining Brazilian elodea.

Some basic water quality measurements were taken near the Griffy Lake dam. A Secchi measurement was taken and found to be 10.0 feet. A dissolved oxygen and temperature profile was also completed. The profile found oxygen levels above 5.0 mg/l to a depth of 16.0 feet. Temperatures ranged from 81.5 degree Fahrenheit on the surface to 59.3

degrees on the bottom (Figure 3). It appeared that Griffy Lake was stratified at the time of the survey.

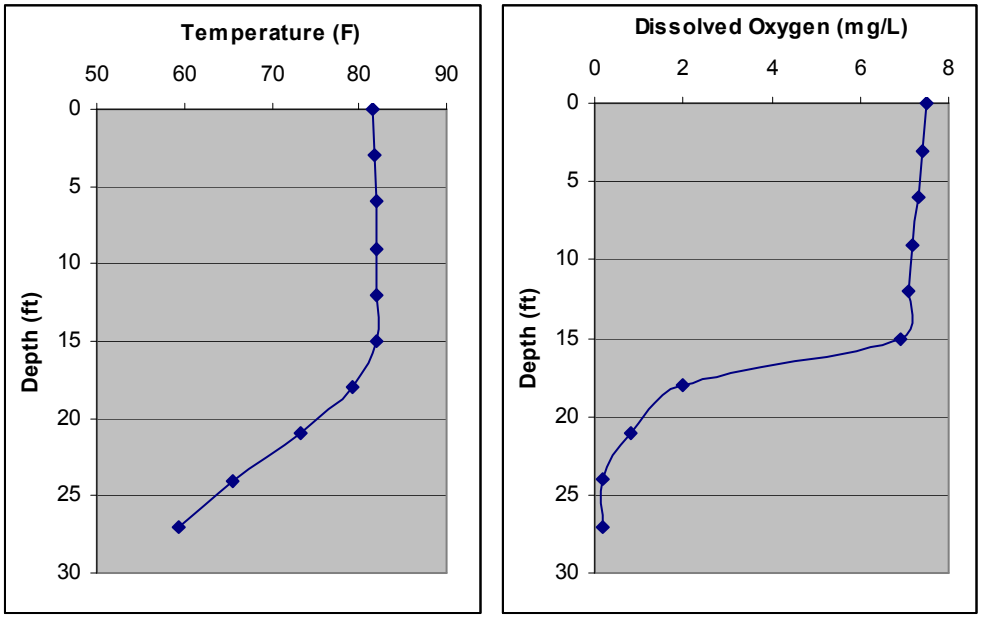

Figure 3. Dissolved oxygen and temperature profiles from Griffy Lake, August 8, 2007.

A total of 100 sites were sampled. Plants were growing to a maximum depth of 13.0 feet. Chara was the only species collected and it was found at 28% of the survey sites, predominantly in the upper end of the lake. Chara was most abundant where water depth was 5.0 feet or shallower. Location and density of Chara is illustrated in Figure 4. Creeping water primrose, common cattail, swamp rose mallow, and water willow were observed during sampling (Table 2).

Table 2. Griffy Lake, Occurrence and Abundance of Aquatic Plants August 21, 2007.

Occurrence and abundance of submersed aquatic plants in Griffy Lake							
County:	Monroe	Sites with plants:	28	Mean species/site:	0.28		
Date:	8.21.07	Sites with native plants:	28	Standard error (ms/s):	0.0451261		
Secchi (ft):	10	Number of species:	1	Mean native species/site:	0.28		
Maximum plant depth (ft):	13	Number of native species:	1	Standard error (mns/s):	0.0451261		
Trophic status	Mesotrophic	Maximum species/site:	1	Species diversity:	0.00		
Total sites:	100			Native species diversity:	0.00		
Depth: 0 to 20 ft	**Frequency of**	**Rake score frequency per species**				**Plant Dominance**	
Species	**Occurrence**	**0**	**1**	**3**	**5**		
Chara	28.0	72.0	13.0	11.0	4.0	13.2	
Depth: 0 to 5 Feet	**Frequency of**	**Rake score frequency per species**				**Plant Dominance**	
Species	**Occurrence**	**0**	**1**	**3**	**5**		
Chara	56.0	44.0	20.0	24.0	12.0	30.4	
Depth: 5 to 10 Feet	**Frequency of**	**Rake score frequency per species**				**Plant Dominance**	
Species	**Occurrence**	**0**	**1**	**3**	**5**		
Chara	37.1	62.9	20.0	14.3	2.9	15.4	
Depth: 10 to 15 feet	**Frequency of**	**Rake score frequency per species**				**Plant Dominance**	
Species	**Occurrence**	**0**	**1**	**3**	**5**		
Chara	3.2	96.8	3.2	0.0	0.0	0.6	
Depth: 15 to 20 feet	**Frequency of**	**Rake score frequency per species**				**Plant Dominance**	
Species	**Occurrence**	**0**	**1**	**3**	**5**		
No Plants Collected							
Species Observed: Creeping water primrose, Hibiscus spp., Common cattail, and water willow							

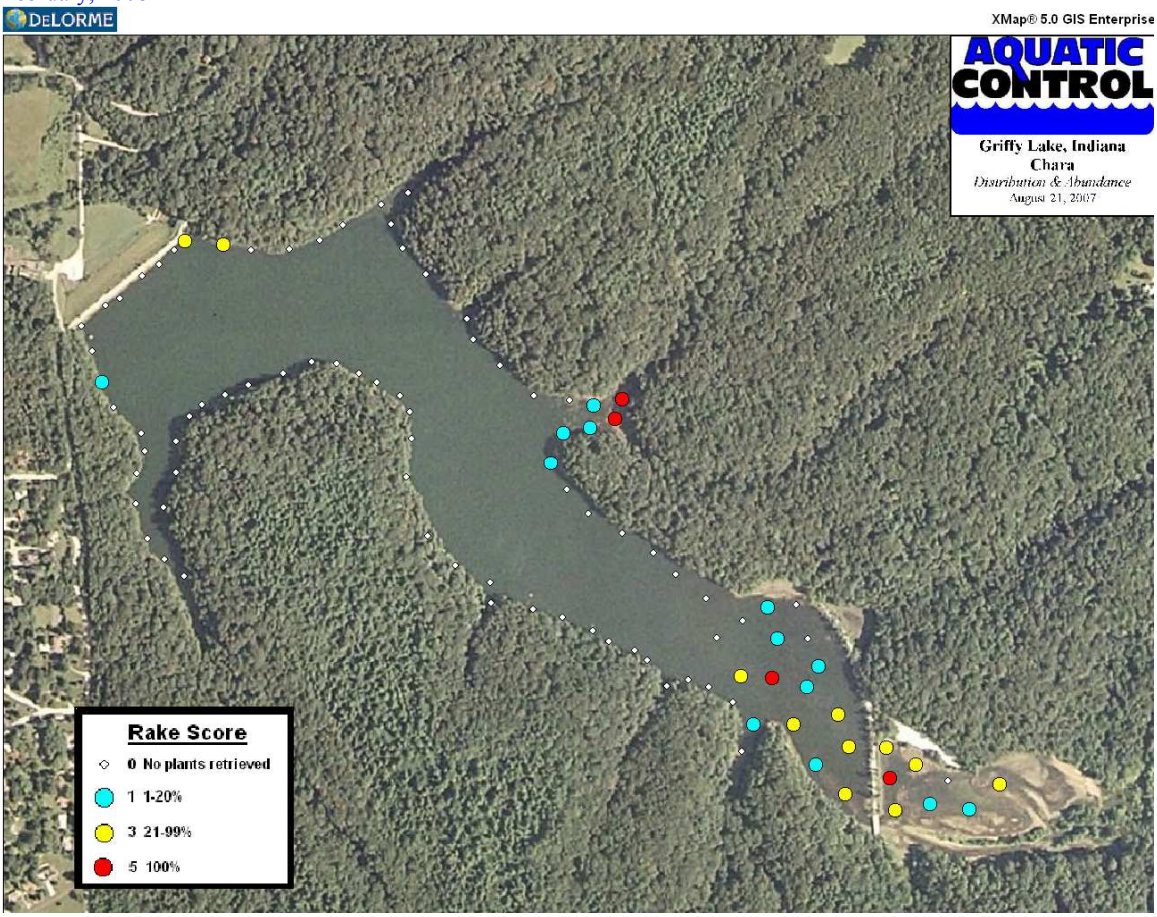

Figure 4. Griffy Lake, Chara distribution and abundance, August 8, 2007.

6.4 Aquatic Vegetation Sampling Discussion

The primary goal of the vegetation management plan is the eradication of Brazilian elodea. In order to meet this goal, whole lake fluridone treatments were completed in 2006 and 2007. Two fragments of Brazilian elodea were detected by IDNR in the spring survey, but none was observed or collected during the summer survey. The reduction in Brazilian elodea abundance is illustrated in Figure 5.

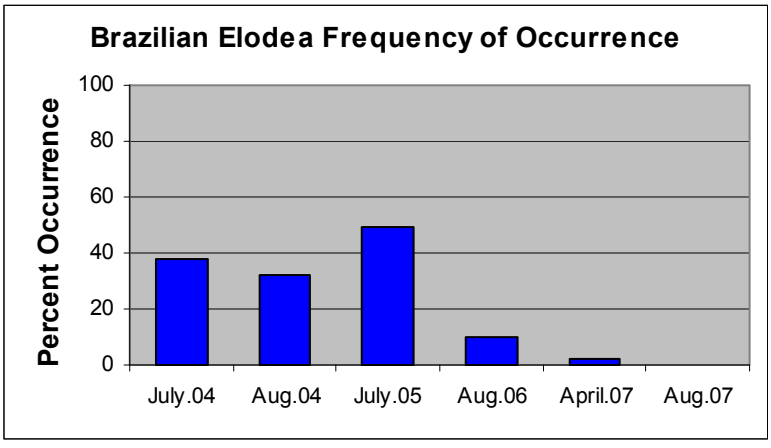

Figure 5. Griffy Lake, Brazilian elodea percent occurrence in the last six surveys (July 2004, July 2005, and April 2007 data collected by IDNR).

Brazilian elodea was not the only invasive exotic species found during previous sampling. Eurasian watermilfoil was also abundant prior to the fluridone applications. This species is very susceptible to fluridone at low rates and was not discovered during the August 2006 or 2007 sampling (Figure 6). However, a small patch of milfoil was reported upstream of Griffy Lake in Griffy Creek. This patch was likely the source of fragments that were observed following a heavy storm in 2006. This patch was treated in the summer of 2007.

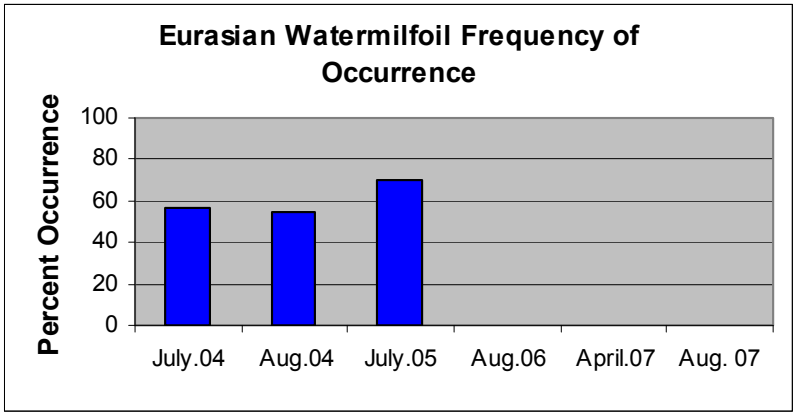

Figure 6. Griffy Lake, Eurasian watermilfoil percent occurrence in the last six surveys (July 2004, July 2005, and April 2007 data collected by IDNR).

Curlyleaf pondweed is another invasive exotic species in Griffy Lake. This plant was damaged by the treatment but will likely return next season due to the presence of reproductive structures called turions (curlyleaf pondweed turions are not affected by herbicide and can remain viable in the bottom sediments for several years). Curlyleaf pondweed was abundant in the spring of 2007 following the 2006 Sonar application (Figure 7).

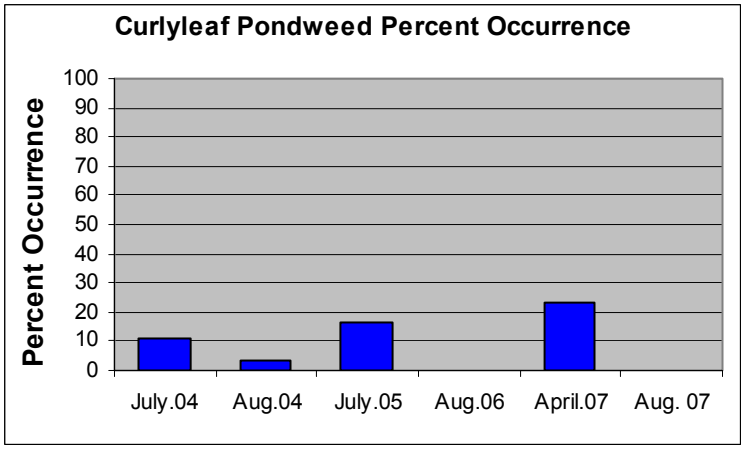

Figure 7. Griffy Lake, curlyleaf pondweed percent occurrence in last six surveys (July 2004, July 2005, and April 2007 data collected by IDNR).

From the outset of this treatment it was clear that there would be damage to the native plant population due to the need to use high rates of fluridone over extended periods of

time. This reduction is illustrated in Figure 8 which compares the average number of species collected per site and Table 3 which compares the percent occurrence of species collected in the last six surveys. There was an increase in Chara percent occurrence which may be due to this species colonizing areas that were once occupied by other submersed vascular plants.

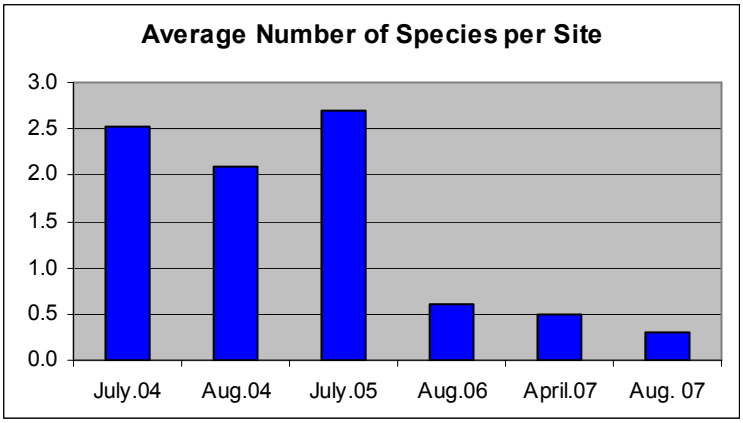

Figure 8. Griffy Lake, average number of species collected per site in the last six surveys (July 2004, 2005, and April 2007 data collected by IDNR).

Table 3. Griffy Lake, percent occurrence of submersed macrophytes in the last six surveys.

Species	% of survey sites (7/04)	% of survey sites (8/04)	% of survey sites (7/05)	% of survey sites (8/06)	% of survey sites (4/07)	% of survey sites (8/07)
Brazillian elodea (*Egeria densa*)	37.8%	32.3%	49.3%	10.0%	2.4%	
Eurasian watermilfoil (*Myriophyllum spicatum*)	56.8%	54.8%	69.9%			
curlyleaf pondweed (*Potamogeton crispus*)	10.8%	3.2%	16.4%		23.5%	
common coontail (*Ceratophyllum demersum*)	91.9%	80.6%	72.6%	38.0%	1.2%	
Chara (Chara spp.)	8.1%	3.2%	2.7%	10.0%	14.1%	28.0%
Slender naiad (*Najas flexillis*)	5.4%	3.2%	15.1%			
sago pondweed (*Potamogeton pectinatus*)	10.8%	8.1%	8.2%		3.5%	
small pondweed (*Potamogeton pusillus*)	2.7%	1.6%	8.2%			
American pondweed (*Potamogeton nodosus*)	5.4%	1.6%	2.7%			
horned pondweed (Zannachellia palustris)	5.4%			2.0%		
brittle naiad (*Najas minor*)	8.1%	21.0%	17.8%			
water stargrass (Zosterella dubia)					1.2%	

One of the main concerns prior to the fluridone treatment was that once the plants were removed, Griffy Lake would become turbid due to an increase in nutrient levels. This did not occur. Secchi measurements taken over the last four years are graphically illustrated in Figure 9. Secchi measurements can be highly variable due to many environmental factors, but it appears that there was not a negative trend in water clarity following the treatments.

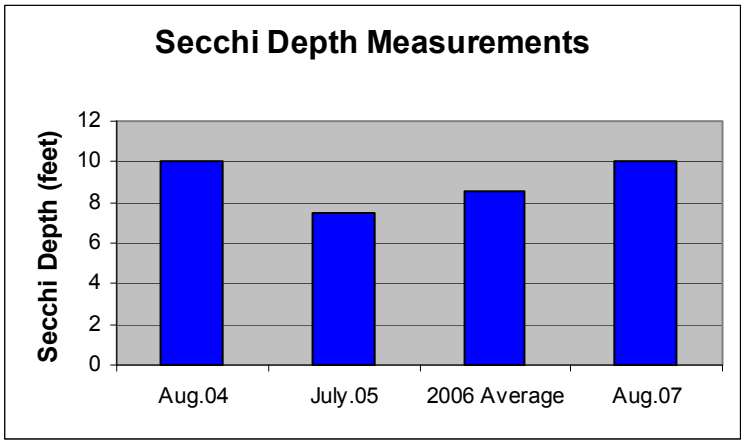

Figure 9. Griffy Lake, Secchi measurements from the last four seasons (July 2004 and July 2005 data collected by IDNR, 2006 average calculated from five measurements taken by Aquatic Control on May 1, May 11, June 15, July 7, and August 8).

7.0 2007 VEGETATION CONTROL

In late 2005, IDNR made the decision to complete a whole lake fluridone treatment on Griffy Lake. Aquatic Control Inc. won the bid to complete the treatment. The goal of the treatment was to eradicate Brazilian elodea with the use of fluridone. In 2006, at least a 6 ppb concentration was present in Griffy Lake for 180 consecutive days. A few fragments of Brazilian elodea were still present at the end of 2006 and beginning of 2007. It was decided that one more season of fluridone treatments would be needed in order to meet the eradication goal. The prescription for the 2007 fluridone treatment was to maintain fluridone levels above 5 ppb for 120 days.

The initial application was completed on May 1. Sonar formulations were adjusted in an attempt to overcome the potentially heavy spring rain dilution that occurred in the 2006 treatment. The Bloomington Parks Department removed several boards from the overflow several weeks in advance in order to lower the lake prior to treatment. The boards were replaced immediately following application. Granular Sonar PR (precision release) was applied at a rate of 18 ppb while 6 ppb of liquid Sonar AS was also applied. Sonar PR was applied to strategic locations around the lake (Figure 10). A gas powered spreader was used to apply Sonar PR to the selected areas and dropper hoses were used to apply Sonar AS evenly around the shoreline. An airboat was used in the application in order to access shallow water areas.

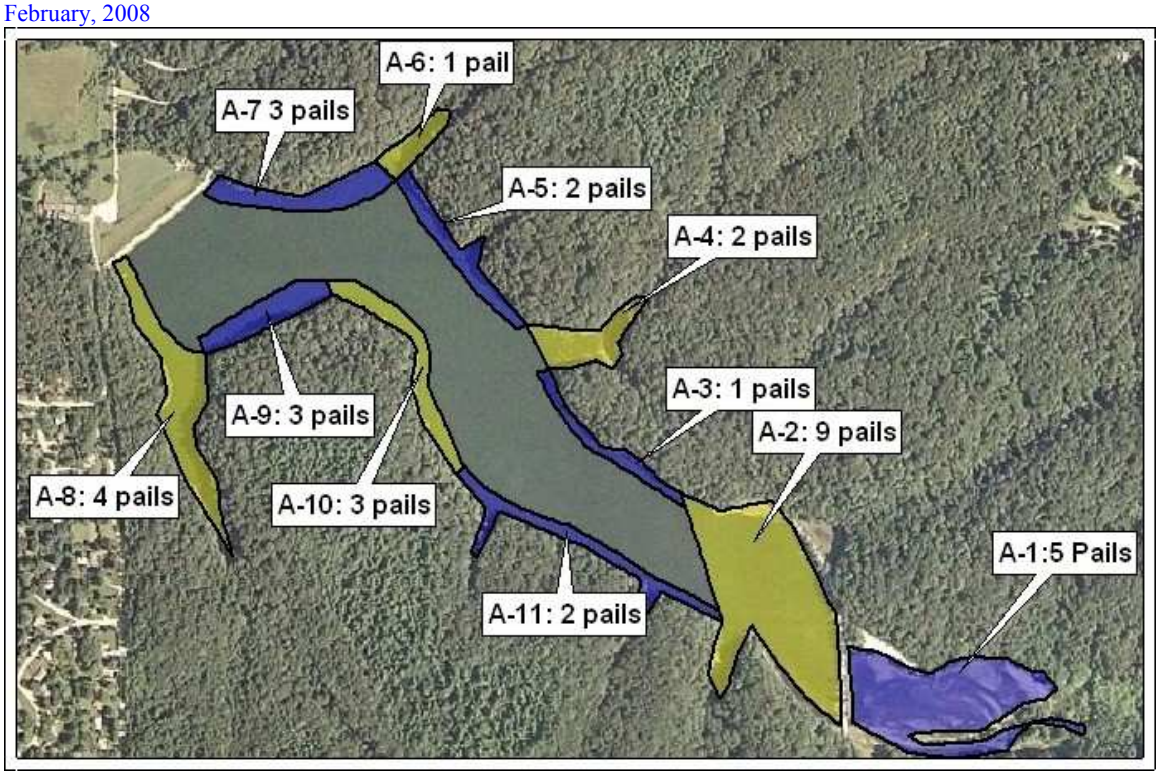

Figure 10. Griffy Lake, May 1, 2007, Sonar PR treatment areas.

Regular testing of fluridone levels (FasTEST) was completed at 10, 20, 30, 45, 60, 90, and 120 days after treatment. Samples were collected from three locations within the lake. Site 1 was near the boat ramp, site 2 was towards the middle of the lake, and site 3 was near the overflow (Figure 11).

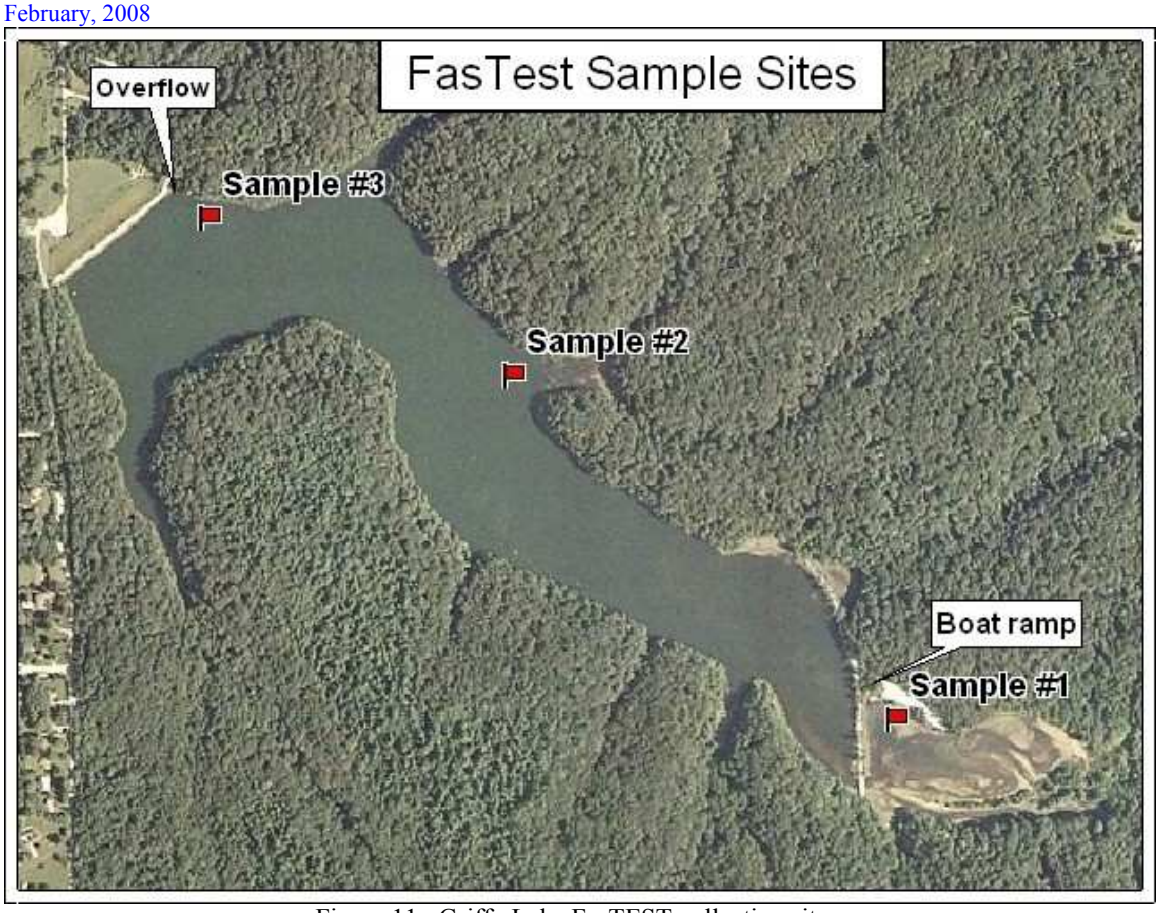

Figure 11. Griffy Lake FasTEST collection sites.

Compared to 2006, there was very little rain in the spring and summer of 2007, so fluridone levels remained higher than expected. The 10 day tests indicated an average concentration of 7.7 ppb of fluridone was present in Griffy Lake. This was likely reflecting the 6 ppb Sonar AS application along with some release from Sonar PR. The May 21 sample indicated a concentration of 19.2 ppb. Test results were higher than expected. This was likely due to the lack of rainfall since the time of application which allowed the fluridone from Sonar AS to remain in the lake along with an increased amount of fluridone released from Sonar PR. The June 4, June 20, and July 5 tests indicated a slight drop in levels. By July 27, tests indicated that fluridone levels had reached the 5.0 ppb minimum. At this time a bump application was scheduled in order to maintain concentrations above 5.0 ppb until September 4. The bump application was completed on August 3 with a 4.0 ppb combination of Sonar AS, Sonar PR, and Sonar Q (Sonar PR & Q are both granular formulations). In addition, a treatment was completed to Griffy Creek on August 21. This treatment was completed due to the discovery of Eurasian watermilfoil within the stream feeding Griffy Lake (Figure 12). The creek treatment was completed with Sonar Q at a rate of 70 ppb for the creek or a 0.2 ppb concentration for the whole lake (70 ppb rate figured by calculating the area furthest upstream treatment location to the mouth of the stream where it enters Griffy Lake, while the 0.2 ppb figured the volume of water starting at the furthest upstream treatment location to the dam of Griffy Lake). The final FasTEST samples were collected on September 4 and levels were found to be at 5.1 ppb thus achieving the goal of

maintaining fluridone above a level of 5.0 ppb for 120 days. Table 4 and Figure 13 help to illustrate the FasTEST results.

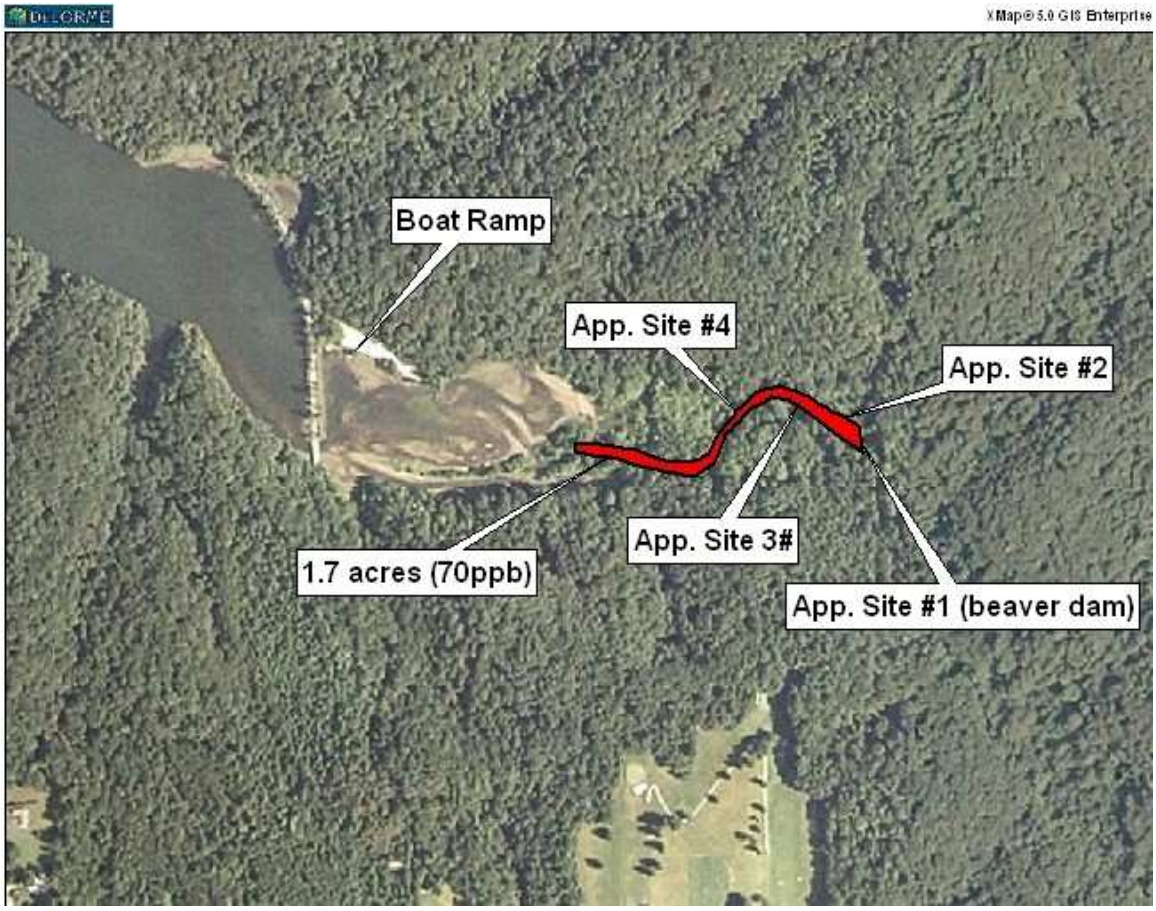

Figure 12. Griffy Lake, Griffy Creek treatment, August 21, 2007.

Table 4. Griffy Lake, 2007 fluridone levels (levels expressed in ppb).

Date	Site 1	Site 2	Site 3	Average
May 11, 2007	6.4	8.6	8.1	7.7
May 21, 2007	24.7	14.0	19.0	19.2
June 4, 2007	17.1	11.9	12.0	13.7
June 20, 2007	15.2	10.4	15.2	13.6
July 5, 2007	6.8	5.5	9.0	7.1
July 27, 2007	3.5	4.6	6.9	5.0
September 4, 2007	5.6	4.8	4.9	5.1

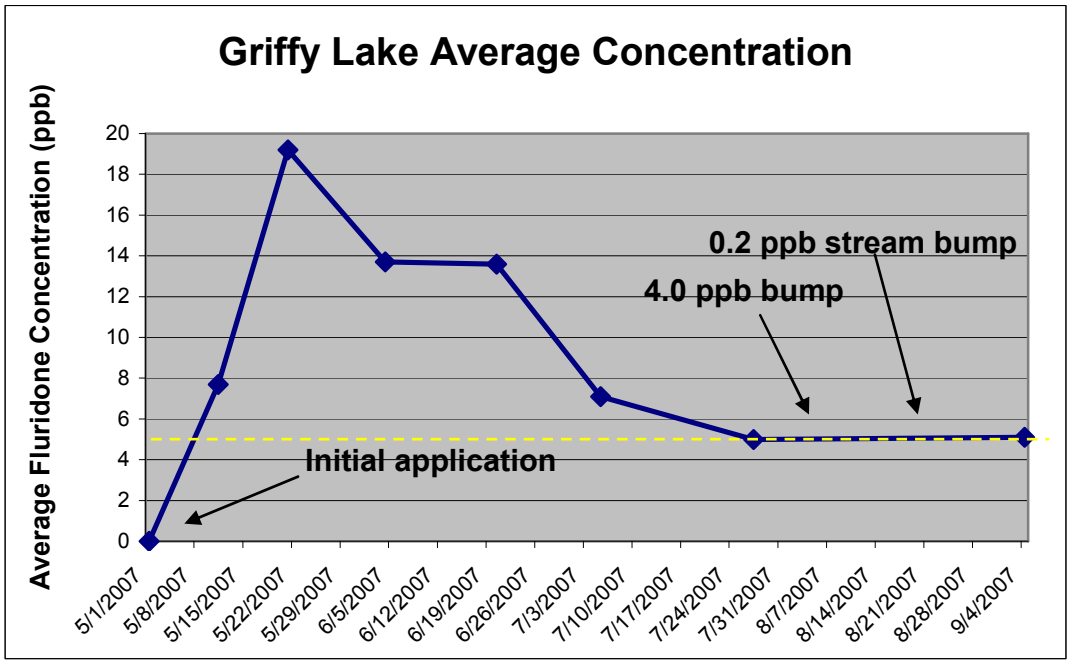

Figure 13. Griffy Lake, 2007 fluridone levels and treatment rates over time.

8.0 AQUATIC PLANT MANAGEMENT ALTERNATIVES

The primary goal of the vegetation management plan is the eradication of Brazilian elodea. Two whole lake fluridone treatments have reduced Brazilian elodea to an undetectable level. In addition to Brazilian elodea, the nuisance exotic species curlyleaf pondweed and Eurasian watermilfoil have also been documented in Griffy Lake. The following is a review of different management alternatives for control of these three invasive exotic species.

8.1 No Action

Although not recommended, no management activity is an alternative approach that must be considered. Over $150,000 has been spent by IDNR in an effort to eradicate Brazilian elodea from Griffy Lake. If one fragment of this plant remains and is not eliminated, Brazilian elodea may return to pre-treatment levels within a few years. This fact makes the detection and control of any remaining Brazilian elodea along with the prevention of reintroductions of Brazilian elodea imperative.

No action is also a management activity that must also be considered for Eurasian watermilfoil. IDNR has funded two whole lake fluridone treatments with no expense to the City of Bloomington. These treatments have reduced Eurasian watermilfoil to an undetectable level. However, this species can also be easily reintroduced and spread rapidly much like Brazilian elodea. The spread of this species may be even faster due to the lack of competition from other submersed species in the lake due to the two years of treatment. It would be a wasted opportunity if this species is reintroduced and allowed to spread to pre-treatment levels. Detection, prevention, and control of Eurasian watermilfoil should be budgeted for in the upcoming season.

Curlyleaf pondweed reproduction is different from Brazilian elodea and Eurasian watermilfoil. Brazilian elodea and Eurasian watermilfoil primarily reproduce through fragmentation while curlyleaf pondweed produces vegetative structures called turions. These turions can lay dormant for several years before sprouting. This was evident in the spring sampling which indicated that curlyleaf pondweed was present at 23.5% of sample sites despite the previous year's treatment. The 2006 and 2007 treatments were completed early enough in the season to likely reduce the amount of turion production in those years. However, it is likely that there are still viable turions that sprouted in the fall of 2007 and will produce nuisance levels of curlyleaf pondweed in the spring of 2008. If nothing is done to control curlyleaf pondweed in the spring of 2008, curlyleaf pondweed will likely spread to pretreatment levels and replenish a turion bank that was likely depleted thanks to the 2006 and 2007 treatments. In addition, the lack of competition from other submersed vegetation may increase the rate of the spread. It typically takes 3-4 years of continued treatment of curlyleaf pondweed in order to deplete a turion bank, so managers have been rewarded a two year head start in achieving significant reductions in curlyleaf pondweed.

8.2 Institutional-Protection of Beneficial Vegetation and Preventing Introduction of Invasive Species

Presence of beneficial vegetation can inhibit the growth of species which may be more prone to create nuisance conditions. Protection of beneficial vegetation should be part of any vegetation management plan. Unfortunately, due to the need to control Brazilian elodea with high rates of Sonar, very little native submersed vegetation remained in Griffy Lake at the end of the 2007 treatment. Many of the pondweed species previously found in Griffy Lake will likely return next season at lower levels. These species should be protected so that they can colonize areas that were once dominated by invasive species.

Now that two seasons of treatment have been completed, it is vitally important that invasive species are not allowed to return to Griffy Lake. The public boat launch area is the most likely area for reintroduction to occur. It is recommended that the Parks Department institutes inspections on all boats entering or leaving Griffy Lake. This should help prevent the return of invasive species. In addition, there appears to be a source of Eurasian watermilfoil upstream of Griffy Lake. In 2007, a small patch of Eurasian watermilfoil detected and treated in Griffy Creek, but it is likely that these plants were introduced from an upstream location. The Parks Department should conduct a search of the Griffy Lake watershed and work to eradicate any areas of Eurasian watermilfoil which are discovered.

8.3 Environmental Manipulation

8.3.1 Water Level Manipulation

Water level manipulation refers to the raising of water levels to control aquatic vegetation by drowning or lowering to control aquatic vegetation by exposing them to freezing, drying or heat. Due to the depth that vegetation grows and the recent lack of hard winter freezes, this technique is not recommended for control of vegetation in Griffy Lake.

8.3.2 Nutrient Reduction

Plant growth can be limited if at least one nutrient, which is critical for growth, is in short supply. Nitrogen, phosphorus or carbon are usually the nutrients limiting plant growth in lakes. Therefore, if at least one of these nutrients can be limited sufficiently so that plants do not grow to a nuisance level, this nutrient limitation can be used as a method of aquatic plant management. Generally, plants in Indiana can obtain the majority of necessary nutrients from the soil. However, in certain situations, nutrient reduction can be effective at controlling overabundant floating vegetation or microscopic algae blooms since they obtain nutrients from the water column. It appears that Griffy Lake has relatively low nutrient levels and continued watershed improvements should preserve the lake for future generations.

8.4 Mechanical Control-Harvesting, Cutting, Dredging

Mechanical control includes cutting and/or harvesting of aquatic vegetation or dredging the bottom sediments to eliminate aquatic plant growth. The main advantage to mechanical control is the immediate removal of the plant growth from control areas and the removal of organic matter and nutrients.

One of the most common mechanical control techniques used on larger lakes in Indiana is mechanical harvesting. Mechanical harvesting uses machines which cut plant stems and, in most cases, pick up the cut fragments for disposal. This type of mechanical control has little selectivity. Where a mix of Eurasian watermilfoil and native species exists, harvesting favors the plant species that grow back most rapidly following harvesting. In most cases, Eurasian watermilfoil recovers from harvesting much more rapidly than native plants. Thus, repeated harvesting hastens the replacement of native species by Eurasian watermilfoil and often leads to dense monocultures of Eurasian watermilfoil in frequently harvested areas (Figure 14). Harvesting also stirs up bottom sediments thus reducing water clarity, kills fish and many invertebrates, and hastens the spread of Eurasian watermilfoil via fragmentation.

Figure 14. Picture of a harvester sitting in middle of milfoil bed.

Dredging of shallow areas may reduce nuisance conditions caused by vegetation in the short-term, but studies and personal experience have shown that Eurasian watermilfoil is often the first species to colonize these disturbed areas. Dredging is expensive, especially if a nearby disposal sight is not available. Careful consideration to secondary environmental effects must be considered and permits from regulatory agencies are usually necessary before conducting dredging operations.

8.5 Manual Control-Hand Pulling, Cutting, Raking

Removal of small amounts of vegetation by hand, which interfere with high use areas, may be the only vegetation control necessary in some areas. Of course, hand removal is labor intensive and must be conducted on a routine basis. The frequency and practicality of continued hand removal will depend on availability of labor, regrowth or reintroduction potential of the vegetation, and the level of control desired (Hoyer & Canfield, 1997). A 625 square foot area can be harvested without obtaining a permit from IDNR.

8.6 Biological Controls

Biological controls reduce aquatic vegetation using other organisms that consume aquatic plants or cause them to become diseased. The main biological controls for nuisance vegetation used in Indiana are the grass carp, milfoil weevil, and a variety of insects

which prey upon purple loosestrife. Any use of biological controls or stocking fish in public waters in Indiana requires a permit from the IDNR Division of Fish and Wildlife.

8.6.1 Grass Carp

The grass carp (*Ctenopharyngodon idella)* is an herbivorous fish imported from Asia. Triploid grass carp, the sterile genetic derivative of the diploid grass carp, are legal for use in Indiana, but are not permitted for stocking in any natural lakes in the state. Grass carp tend to produce all or nothing aquatic plant control. It is very difficult to achieve a stocking rate sufficient to selectively control nuisance species without eliminating all submersed vegetation. They are not particularly appropriate for Eurasian watermilfoil control because this species is low on their feeding preference list; thus, they eat most native plants before consuming Eurasian watermilfoil (Smith, 2002). However, grass carp can be effective at controlling Brazilian elodea. Grass carp are difficult to remove from a lake once they have been stocked. Due to the legal concerns, all or nothing control, the difficulty in removing grass carp once stocked, and ineffectiveness of the grass carp to correct many vegetation problems, grass carp are not recommended for nuisance vegetation control in Griffy Lake.

8.6.2 Milfoil Weevil

The milfoil weevil, *Euhrychiopsis lecontei,* is a native North American insect that consumes Eurasian and Northern watermilfoil. The weevil was discovered following a natural decline of Eurasian watermilfoil in Brownington Pond, Vermont (Creed and Sheldon, 1993), and has apparently caused declines in several other water bodies. Weevil larvae burrow in the stem of Eurasian watermilfoil and consume the vascular tissue thus interrupting the flow of sugars and other materials between the upper and lower parts of the plant. Holes where the larvae burrow into and out of the stem allow disease organisms a foothold in the plants and allow gases to escape from the stem, causing the plants to lose buoyancy and sink (Creed et al. 1992).

Concerns about the use of the weevil as a biological control agent relate to whether introductions of the milfoil weevil will reliably produce reductions in Eurasian watermilfoil and whether the resulting reductions will be sufficient to satisfy users of the lake (Smith, 2002). Following our research, no conclusive data concerning the role of weevils in reducing Eurasian watermilfoil populations has been made available. In 2003, Scribailo and Alix conducted a weevil release on Griffy Lake and had no conclusive evidence supporting the use of weevils in reducing milfoil populations. Weevils may reduce milfoil populations in some lakes, but predicting which lakes and how much, if any, control will be achieved has not been documented (Scribailo & Alix 2003).

8.7 Chemical Control

Chemical control uses chemical herbicides to reduce or eliminate aquatic plant growth. The main perceived disadvantage to the use of chemicals is the publics concern over safety. Extensive testing is required of aquatic herbicides to ensure that the herbicides are low in toxicity to human and animal life and they are not overly persistent or bioaccumulated in fish or other organisms. It often takes several decades of testing by the Environmental Protection Agency (E.P.A.) before an herbicide is approved for aquatic use. After E.P.A. approval and registration, the herbicide must go through the

registration process in each state. In addition, commercial aquatic applicators must obtain a license to apply aquatic herbicides in the state of Indiana.

Most aquatic herbicides have water use restrictions that must be followed following their use. These restrictions must be posted prior to treatment on a public body of water. Aquatic herbicides typically have a 0-1 day swimming restriction, 0-30 day irrigation restrictions, and 0-21 day drinking water restrictions.

Another potential drawback to herbicide use is the potential release of nutrients that can occur if large areas of vegetation are controlled. This can be avoided by early application that controls vegetation before it reaches its maximum biomass. These perceived disadvantages are often times out-weighed by this technique's documented rapid effectiveness and selectivity.

There are two different types of aquatic herbicides, systemic and contact. Systemic herbicides are translocated throughout the plants and thereby kill the entire plants. Fluridone (trade name Sonar & Avast!), 2,4-D (trade name Navigate, Aqua-Kleen, & DMA4 IVM), and triclopyr (trade name Renovate) are systemic herbicides that can effectively control Eurasian watermilfoil. Triclopyr, imazypry, and glyphosate are systemic herbicides that can control purple loosestrife.

Based upon Aquatic Control's first hand experience and personal communication with an array of North American aquatic plant managers, it appears that whole-lake fluridone applications are the most effective means of controlling Eurasian watermilfoil and Brazilian elodea. Successful fluridone treatments yield a dramatic reduction in the abundance of Eurasian watermilfoil, often reducing it to the point that Eurasian watermilfoil plants are difficult to detect following treatment (Smith, 2002). The two fluridone treatments completed on Griffy Lake have reinforced this statement since no rooted milfoil has been detected for the past two seasons. When treating for control of Eurasian watermilfoil, an advantage to using fluridone over most contact herbicides is its selectivity. Most strains of Eurasian watermilfoil have a lower tolerance to fluridone than the majority of native species, so if the proper rates are applied Eurasian water milfoil can be controlled with little harm to the majority of native species. However, when treating for control of Brazilian elodea, higher rates of fluridone are required thus limiting the selectivity of this herbicide.

Triclopyr is a systemic herbicide that has recently been approved for use in aquatics. Triclopyr typically is used for treating isolated Eurasian watermilfoil beds as opposed to whole lake treatments. This herbicide is very selective to Eurasian watermilfoil, and has no effect on Brazilian elodea or curlyleaf pondweed. A study was conducted in 1997 during the registration process of this herbicide. The study found Eurasian watermilfoil biomass was reduced by 99% in treated areas at 4 weeks post-treatment, remained low one year later, and was still at acceptable levels of control at two years post-treatment. Non-target native plant biomass increased 500-1000% by one year post-treatment, and remained significantly higher in the cove plot at two years post-treatment. Native species diversity doubled following herbicide treatment, and the restoration of the community delayed the re-establishment and dominance of Eurasian watermilfoil for three growing seasons (Getsinger et. al., 1997). Triclopyr is a good alternative to fluridone when

Eurasian watermilfoil is not abundant throughout an entire water body. The primary water-use restriction following a triclopyr treatment is irrigation. An assay is needed to monitor the concentration in the water before irrigation can take place. One of the drawbacks to using triclopyr has been the fact that only a liquid formulation has been available. This can dramatically increase costs for treatment in deep water areas. In 2007, a granular formulation called Renovate OTF was approved for aquatic use in Indiana. Triclopyr would be a good tool for use on isolated patches of Eurasian watermilfoil if or when this species returns to Griffy Lake.

Applied properly, 2,4-D can also yield major reductions in the abundance of Eurasian watermilfoil. Much like triclopyr, treatments must be even and dose rates accurate. This formulation should be used much like Triclopyr. Unlike Triclopyr, 2,4-D can impact the native species coontail. This herbicide can be applied for less cost than triclopyr, but damage will likely occur to coontail. 2,4-D herbicide should be considered as an alternative to triclopyr applications if there are severe budget restrictions. 2,4-D is also available in liquid and granular formulations.

Contact herbicides can also be effective for controlling submersed vegetation in the short term. The three primary contact herbicides used for control of submersed vegetation are diquat (trade name Reward), endothal (trade name Aquathol), and copper based formulations (trade names Komeen, Nautique, and Clearigate).

Historically, a drawback to the use of contact herbicides has been the lack of selectivity exhibited by these herbicides. However, a study completed by Skogerboe and Getsinger in 2002 outlines how endothal can be used for control of the exotic species curlyleaf pondweed and Eurasian watermilfoil with little effect on the majority of native species. They found early season treatments with endothall effectively controlled Eurasian watermilfoil and curlyleaf pondweed at several application rates with no regrowth eight weeks after treatment. Sago pondweed, eel grass, and Illinois pondweed biomass were also significantly reduced following the endothall application, but regrowth was observed at eight weeks post-treatment. Coontail and elodea showed no effects from endothall at three of the lower application rates. Spatterdock, pickerelweed, cattail, and smartweed were not injured at any of the application rates (Skogerboe & Getsinger 2002). This type of treatment strategy could be applied to lakes that have large areas of both curlyleaf pondweed and Eurasian watermilfoil. Endothal could also be effective the year after whole lake sonar treatments where curlyleaf pondweed typically returns the following season. As discussed in section 8.1, under this treatment regime, several years of application may be required to exhaust the curlyleaf pondweed turion supply.

Diquat and many of the copper formulations are effective fast acting contact herbicides. These formulations are typically used when control of all submersed vegetation is desired. These herbicides are commonly used for control of nuisance vegetation around docks and near-shore high-use areas. Diquat and the copper based herbicides are not as selective as many of the other herbicides and plants can often time recover in 4-8 weeks after treatment. There are no water use restrictions following the use of chelated copper based herbicide, which makes them popular choices for lakes used for irrigation or drinking water.

9.0 PUBLIC EDUCATION & INVOLVEMENT

The prevention of reintroduction of invasive exotic species is one of the most important actions that should be taken concerning aquatic plant management in Griffy Lake. The primary public access to Griffy Lake is at the public boat launch area. This area should contain easy to read and understand signage about the need to thoroughly clean boats and trailers prior to launch. If possible, it would also be beneficial to have all boats and trailers visually inspected by the attendant prior to launch. These actions should reduce the chances of reintroduction of invasive species into Griffy Lake.

10.0 ACTION PLAN AND BUDGET UPDATE

The primary goal of the vegetation management plan is the eradication of Brazilian elodea. The last two seasons of treatment appear to have successfully controlled this plant to the point that it was not detectable for much of the 2007 season. Even though Brazilian elodea was not detected during the summer that does not imply that it is officially eradicated. Future plant management should focus on detection of any remaining Brazilian elodea. This should include Tier II surveys in early May, early July, and early September of 2008. Each survey should include a minimum of 100 rake tosses. The estimated cost of completing three surveys with 100 points along with plan update is $8,700. The need for this aggressive surveying method should be evaluated at the end of each season. If any Brazilian elodea is detected it should be immediately dealt with in order to prevent spread. If detected in rake sampling, a 5-acre area surrounding the detection site should be treated with 150 ppb of Sonar PR. This area should be sampled again 12 weeks after treatment with a minimum of 20 rake tosses along with a visual inspection. If needed, the estimated cost of this type of treatment is $10,000. It is highly unlikely, but if Brazilian elodea is detected during the spring sampling in multiple areas or in locations greater than 1-acre, then another whole lake treatment should be initiated immediately. The estimated cost of another whole lake fluridone treatment is $66,000. Due to the importance placed on the eradication of Brazilian elodea, it is recommended that IDNR budget for these actions.

Eurasian watermilfoil and curlyleaf pondweed are two other invasive species that have reached nuisance levels in Griffy Lake. Due to their differences in reproduction it is unlikely that Eurasian watermilfoil will be present in 2008, but curlyleaf pondweed could potentially reach nuisance levels. Tier II sampling should be adequate to detect any areas of Eurasian watermilfoil. If Eurasian watermilfoil is detected it will likely be present at very low levels. The areas should be quickly treated with granular Renovate OTF herbicide (active ingredient: triclopyr). The estimated cost of this type of treatment is difficult to figure due to the likelihood that a reifestation of milfoil would be at a very low level. However, the typical cost treating milfoil with Renovate OTF is roughly $600/acre.

Early season treatment of curlyleaf pondweed should be initiated this season with low doses of Aquathol K herbicide (active ingredient: endothal). If initiated, a map detailing curlyleaf areas should be completed in early April. Treatment may be needed for up to three consecutive seasons in order to exhaust turion supplies. Up to 20 acres of curlyleaf may require treatment. The estimated cost of this treatment would be $5,000. The cost of mapping curlyleaf beds would be $500. The curlyleaf pondweed and potential

Eurasian watermilfoil treatments would require funding from LARE and/or the City of Bloomington Parks Department.

The past two seasons of treatment have reduced the abundance of native vegetation. Chara (*Chara spp.)* was the only submersed species detected during the summer Tier II survey. Several species of pondweed will likely return next season. The presence of these species should be well documented with the intensive sampling. If diversity has not significantly improved by 2009 steps may be needed in order to re-introduce native vegetation.

Table 5 illustrates a predicted budget for plant management action on Griffy Lake for the next 5 years.

Table 5. Predicted budget for Griffy Lake plant management action plan.

Action	Funding Source	2008	2009	2010	2011	2012
Point Sampling and Plan Update (Three T2 Surveys, 100 Points)	IDNR	$8,700.00	$8,700.00	$8,700.00	-	-
Milfoil Spot Treatments	LARE/Parks	-	-	$600.00	$600.00	$600.00
Early Season Curlyleaf Treatments*	LARE/Parks	$5,000.00	$5,000.00	$5,000.00	-	-
Early Season Curlyleaf Mapping	LARE/Parks	$500.00	$500.00	$500.00	-	-

*Should assess need for curlyleaf treatment each season due to potential impact of fluridone treatments in 2006 & 2007

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12.0 APPENDIX UPDATE

12.1 2007 Sampling Data

Lake	Date	Latitude	Longitude	Design	Site	Depth	RAKE	CH?AR	ALGA
Griffy	8.21.07	39.197931	-86.513026		1	4.0	3	3	
Griffy	8.21.07	39.197674	-86.512445		2	4.0	3	3	
Griffy	8.21.07	39.197448	-86.511822		3	2.0			p
Griffy	8.21.07	39.197384	-86.510825		4	1.0	3	3	
Griffy	8.21.07	39.197481	-86.512957		5	4.0	5	5	
Griffy	8.21.07	39.197094	-86.512168		6	2.0	1	1	
Griffy	8.21.07	39.197009	-86.51142		7	2.0	1	1	p
Griffy	8.21.07	39.196998	-86.512846		8	2.0	3	3	p
Griffy	8.21.07	39.197234	-86.513816		9	1.0	3	3	p
Griffy	8.21.07	39.197685	-86.514397		10	3.0	1	1	p
Griffy	8.21.07	39.198285	-86.514826		11	4.0	3	3	
Griffy	8.21.07	39.198285	-86.515615		12	6.0	1	1	
Griffy	8.21.07	39.197888	-86.515837		13	3.0			
Griffy	8.21.07	39.199006	-86.515855		14	8.0	3	3	
Griffy	8.21.07	39.198983	-86.515242		15	7.0	5	5	p
Griffy	8.21.07	39.198843	-86.514563		16	6.0	1	1	
Griffy	8.21.07	39.198425	-86.513968		17	7.0	3	3	
Griffy	8.21.07	39.197942	-86.513746		18	6.0	3	3	
Griffy	8.21.07	39.199159	-86.51434		19	7.0	1	1	
Griffy	8.21.07	39.199584	-86.514549		20	7.0			
Griffy	8.21.07	39.199573	-86.515145		21	6.0	1	1	
Griffy	8.21.07	39.200099	-86.514771		22	5.0			p
Griffy	8.21.07	39.200045	-86.515338		23	7.0	1	1	
Griffy	8.21.07	39.199862	-86.515809		24	7.0			
Griffy	8.21.07	39.1996	-86.516325		25	9.0			
Griffy	8.21.07	39.200191	-86.516523		26	9.0			
Griffy	8.21.07	39.200549	-86.51711		27	12.0			
Griffy	8.21.07	39.200878	-86.517545		28	12.0			
Griffy	8.21.07	39.201171	-86.518163		29	13.0			
Griffy	8.21.07	39.201464	-86.518813		30	14.0			
Griffy	8.21.07	39.201837	-86.519229		31	16.0			
Griffy	8.21.07	39.202218	-86.519549		32	13.0	1	1	
Griffy	8.21.07	39.202673	-86.519298		33	7.0	1	1	
Griffy	8.21.07	39.202759	-86.518782		34	3.0	1	1	p
Griffy	8.21.07	39.202888	-86.518301		35	2.0	5	5	
Griffy	8.21.07	39.203185	-86.518164		36	1.0	5	5	
Griffy	8.21.07	39.203092	-86.518703		37	3.0	1	1	
Griffy	8.21.07	39.203189	-86.51918		38	8.0			
Griffy	8.21.07	39.203253	-86.519866		39	12.0			
Griffy	8.21.07	39.203714	-86.520538		40	15.0			
Griffy	8.21.07	39.2041	-86.521056		41	13.0			
Griffy	8.21.07	39.204414	-86.521167		42	12.0			
Griffy	8.21.07	39.205085	-86.521964		43	12.0			
Griffy	8.21.07	39.205474	-86.522413		44	15.0			
Griffy	8.21.07	39.205829	-86.522645		45	12.0			
Griffy	8.21.07	39.206309	-86.522309		46	4.0			
Griffy	8.21.07	39.206128	-86.522828		47	7.0			
Griffy	8.21.07	39.205819	-86.523574		48	12.0			
Griffy	8.21.07	39.205592	-86.524033		49	12.0			
Griffy	0.21.07	39.205455	-06.524627		50	9.0			
Griffy	8.21.07	39.205441	-86.525362		51	8.0			
Griffy	8.21.07	39.205508	-86.525899		52	6.0	3	3	
Griffy	8.21.07	39.20556	-86.526656		53	7.0	3	3	
Griffy	8.21.07	39.205441	-86.526858		54	12.0			
Griffy	8.21.07	39.205225	-86.527157		55	12.0			
Griffy	8.21.07	39.205055	-86.527481		56	11.0			
Griffy	8.21.07	39.204718	-86.527915		57	12.0			
Griffy	8.21.07	39.204615	-86.528187		58	12.0			
Griffy	8.21.07	39.204305	-86.528654		59	12.0			
Griffy	8.21.07	39.203929	-86.52845		60	19.0			
Griffy	8.21.07	39.203443	-86.528263		61	9.0	1	1	
Griffy	8.21.07	39.203081	-86.528035		62	15.0			
Griffy	8.21.07	39.202694	-86.527493		63	18.0			
Griffy	8.21.07	39.202427	-86.527425		64	19.0			
Griffy	8.21.07	39.20207	-86.527595		65	14.0			
Griffy	8.21.07	39.201611	-86.527605		66	12.0			
Griffy	8.21.07	39.201092	-86.527387		67	6.0			
Griffy	8.21.07	39.200785	-86.527052		68	6.0			
Griffy	8.21.07	39.200522	-86.526663		69	2.0			p
Griffy	8.21.07	39.201567	-86.52707		70	14.0			
Griffy	8.21.07	39.202083	-86.52683		71	10.0			
Griffy	8.21.07	39.202566	-86.526828		72	7.0			
Griffy	8.21.07	39.202942	-86.526567		73	4.0			
Griffy	8.21.07	39.203125	-86.526318		74	14.0			
Griffy	8.21.07	39.203264	-86.525875		75	14.0			
Griffy	8.21.07	39.203411	-86.525412		76	9.0			
Griffy	8.21.07	39.203411	-86.525412		77	16.0			
Griffy	8.21.07	39.203596	-86.52474		78	12.0			
Griffy	8.21.07	39.203767	-86.524187		79	20.0			
Griffy	8.21.07	39.203736	-86.523701		80	20.0			
Griffy	8.21.07	39.203585	-86.523263		81	3.0			
Griffy	8.21.07	39.203457	-86.522926		82	10.0			
Griffy	8.21.07	39.203251	-86.522479		83	12.0			
Griffy	8.21.07	39.203006	-86.522289		84	7.0			
Griffy	8.21.07	39.202603	-86.522241		85	20.0			
Griffy	8.21.07	39.202019	-86.522344		86	15.0			
Griffy	8.21.07	39.201135	-86.521939		87	2.0			
Griffy	8.21.07	39.200689	-86.521403		88	11.0			
Griffy	8.21.07	39.200437	-86.520714		89	16.0			
Griffy	8.21.07	39.200131	-86.520711		90	8.0			
Griffy	8.21.07	39.200036	-86.519881		91	8.0			
Griffy	8.21.07	39.199905	-86.519312		92	10.0			
Griffy	8.21.07	39.199712	-86.518735		93	11.0			
Griffy	8.21.07	39.199541	-86.518412		94	10.0			
Griffy	8.21.07	39.199415	-86.517907		95	9.0			
Griffy	8.21.07	39.199262	-86.517679		96	4.0			
Griffy	8.21.07	39.198875	-86.517293		97	1.0			
Griffy	8.21.07	39.198972	-86.516876		98	9.0			
Griffy	8.21.07	39.198868	-86.51648		99	9.0			
Griffy	8.21.07	39.198629	-86.516003		100	5.0			

12.2 2008 Permit Applications

			Return to: Page 1 of 2
	APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT	**FOR OFFICE USE ONLY**	DEPARTMENT OF NATURAL RESOURCES
	State Form 26727 (R / 11-03)	License No.	Division of Fish and Wildlife
	Approved State Board of Accounts 1987		Commercial License Clerk
	☐ Whole Lake ☐ Multiple Treatment Areas	Date Issued	402 West Washington Street, Room W273
	Check type of permit	Lake County	Indianapolis, IN 46204
	INSTRUCTIONS: Please print or type information		FEE: $5.00

Applicant's Name	Lake Assoc. Name	
City of Bloomington Parks and Recreation		
Rural Route or Street		Phone Number
401 N. Morton St. Suite 250		812-349-3736
City and State		ZIP Code
Bloomington, IN		47402
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number
Rural Route or Street		Phone Number
City and State		ZIP Code

Lake (One application per lake)	Nearest Town	County
Griffy	Bloomington	Monroe
Does water flow into a water supply	☐ Yes	☒ No

Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area #	1	LAT/LONG or UTM's	Will Map Prior to Treatment (See AVMP and IDNR Spring T2)		
Total acres to be controlled	<20	Proposed shoreline treatment length (ft)	n.a.	Perpendicular distance from shoreline (ft)	n.a.
Maximum Depth of Treatment (ft)	<15	Expected date(s) of treatment(s)	early April or when water hits consistent 50 degrees		

Treatment method: ☒ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Aquathol K at 1.0 ppm for early season control of curlyleaf pondweed

Plant survey method: ☒ Rake ☐ Visual ☐ Other (specify) Spring 2007 Tier II Survey

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Curlyleaf pondweed	x	50
Chara		30
Sago Pondweed		5
Creeping water primrose		5
water stargrass		5
Brazilian elodea		5

Page 2 of 2

Treatment Area #	2	LAT/LONG or UTM's	Will map prior to treatment, see 2007 AVMP update		
Total acres to be controlled	?	Proposed shoreline treatment length (ft)	?	Perpendicular distance from shoreline (ft)	?
Maximum Depth of Treatment (ft)	20	Expected date(s) of treatment(s)	?		

Treatment method: [x] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Renovate OTF for control of milfoil if it occurs

Plant survey method: [x] Rake [ ] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Curlyleaf pondweed		50
Chara		30
Sago Pondweed		5
Creeping water primrose		5
water stargrass		5
Brazilian elodea		5
Eurasian watermilfoil	x	0

INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.

Applicant Signature	Date
Certified Applicant's Signature	Date

FOR OFFICE ONLY

[ ] Approved [ ] Disapproved	Fisheries Staff Specialist
[ ] Approved [ ] Disapproved	Environmental Staff Specialist

Mail check or money order in the amount of $5.00 to:

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND WILDLIFE
COMMERCIAL LICENSE CLERK
402 WEST WASHINGTON STREET ROOM W273
INDIANAPOLIS, IN 46204

AQUATIC CONTROL

12.3 Herbicide Labels

12.3.1 Renovate OTF Label

Specimen Label

Renovate® OTF

On Target Flakes

SePRO

Aquatic Sites: For control of emersed, submersed and floating aquatic plants in the following aquatic sites: ponds; lakes; reservoirs; marshes; wetlands; impounded rivers, streams and other bodies of water that are quiescent; non-irrigation canals, seasonal irrigation waters and ditches which have little or no continuous outflow.

Active Ingredient:	
triclopyr: 3,5,6-trichloro-2-pyridinyloxyacetic acid, triethylamine salt	14.0%
Other Ingredients	86.0%
TOTAL	100.0%

Acid equivalent: triclopyr - 10.0% - 1.6 ounces per pound.

Keep Out of Reach of Children

CAUTION/PRECAUCIÓN

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Precautionary Statements

Hazards to Humans and Domestic Animals

Causes moderate eye irritation. Avoid contact with eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco.

ENVIRONMENTAL HAZARDS

Under certain conditions, treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of dead plants, which may contribute to fish suffocation. This loss can cause fish suffocation. Therefore, to minimize this hazard, do not treat more than one-third to one-half of the water area in a single operation and wait at least 10 to 14 days between treatments. Begin treatment along the shore and proceed outwards in bands to allow fish to move into untreated areas. Consult with the State agency for fish and game before applying to public water to determine if a permit is needed.

First Aid	
If in eyes	• Hold eye open and rinse slowly and gently with water for 15 - 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 - 20 minutes. • Call a poison control center or doctor for treatment advice.
If swallowed	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If inhaled	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for further treatment advice.

EMERGENCY NUMBER
Have the product container or label with you when calling a poison control center or doctor, or going for treatment. In case of emergency endangering health or the environment involving this product, call **INFOTRAC** at **1-800-535-5053.**

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

Refer to label booklet for additional precautionary information and Directions for Use.

Notice: Read the entire label. Use only according to label directions. **Before using this product, read "Warranty Disclaimer", "Inherent Risks of Use", and "Limitation of Remedies" at end of label booklet. If terms are unacceptable, return at once unopened.**

If you wish to obtain additional product information, please visit our web site at **www.sepro.com**.

EPA Reg. No. 67690-42
FPL 103006

Renovate is a registered trademark of Dow AgroSciences LLC.
Manufactured by: **SePRO Corporation** Carmel, IN 46032 U.S.A.

AQUATIC CONTROL

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read all *Directions for Use* carefully before applying.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application.

For any requirements specific to your state or tribe, consult the agency responsible for pesticide regulation.

General Information

When applying this product follow all applicable use directions, precautions and limitations.

AQUATIC AND WETLAND SITES

Use Renovate® OTF herbicide for control of emersed, submersed and floating aquatic plants in the following aquatic sites: ponds; lakes; reservoirs; marshes; wetlands; impounded rivers, streams and other bodies of water that are quiescent; non-irrigation canals, seasonal irrigation waters and ditches which have little or no continuous outflow.

Obtain Required Permits: Consult with appropriate state or local water authorities before applying this product in and around public waters. State or local public agencies may require permits.

Recreational Use of Water in Treatment Area: There are no restrictions on use of water in the treatment area for recreational purposes, including swimming and fishing.

Livestock Use of Water from Treatment Area: There are no restrictions on livestock consumption of water from the treatment area.

GENERAL USE PRECAUTIONS AND RESTRICTIONS

Chemigation: Do not apply this product through any type of irrigation system.

Irrigation: Water treated with Renovate OTF may not be used for irrigation purposes for 120 days after application or until triclopyr residue levels are determined by laboratory analysis, or other appropriate means of analysis, to be 1.0 ppb or less.

Seasonal Irrigation Waters: Renovate OTF may be applied during the off-season to surface waters that are used for irrigation on a seasonal basis, provided that there is a minimum of 120 days between Renovate OTF application and the first use of treated water for irrigation purposes or until triclopyr residue levels are determined by laboratory analysis, or other appropriate means of analysis, to be 1.0 ppb or less.

Irrigation Canal/Ditches: DO NOT apply Renovate OTF to irrigation canals/ditches unless the 120 day restriction on irrigation water usage can be observed or triclopyr residue levels are determined by laboratory analysis, or other appropriate means of analysis, to be 1.0 ppb or less.

- **Do not** apply Renovate OTF directly to, or otherwise permit it to come into direct contact with grapes, tobacco, vegetable crops, flowers, or other desirable broadleaf plants, and do not permit granule dust to drift into them.
- **Do not** apply to salt water bays or estuaries.
- **Do not** apply directly to un-impounded rivers or streams.
- **Do not** apply on ditches or canals currently being used to transport irrigation water or that will be used for irrigation within 120 days following treatment or until triclopyr residue levels are determined to be 1.0 ppb or less.
- **Do not** apply where runoff water may flow onto agricultural land as injury to crops may result.

Grazing and Haying Restrictions:
Except for lactating dairy animals, there are no grazing restrictions following application of this product.

- **Grazing Lactating Dairy Animals: Do not** allow lactating dairy animals to graze treated areas until the next growing season following application of this product.
- **Do not** harvest hay for 14 days after application.
- Grazed areas of non-cropland and forestry sites may be spot treated if they comprise no more than 10% of the total grazable area.

Slaughter Restrictions: During the season of application, withdraw livestock from grazing treated grass at least 3 days before slaughter.

BEST MANAGEMENT PRACTICES FOR DRIFT MANAGEMENT

Equipment used in the application of Renovate OTF should be carefully calibrated before use and checked frequently during application to be sure it is working properly and delivering a uniform distribution pattern. To prevent increased Renovate OTF dosage above specified limits, do not overlap applications. Aerial application should be made only when the wind velocity is 2 to 10 mph.

Applications should be made only when there is little or no hazard for volatility or dust drift, and when application can maintain Renovate OTF placement in the intended area. Very small quantities of dust, which may not be visible, may seriously injure susceptible plants, and Renovate OTF may be blown outside of the intended treatment area under extreme conditions. Do not spread Renovate OTF when wind is blowing toward susceptible crops or ornamental plants that are near enough to be injured.

Avoiding drift at the application site is the responsibility of the applicator. The interaction of many equipment and weather related factors determine the potential for drift. The applicator is responsible for considering all these factors when making decisions.

AQUATIC CONTROL

Ground Application Equipment: To aid in reducing drift, Renovate OTF should be applied when wind velocity is low (follow state regulations; see Sensitive Area under *Aerial Drift Reduction Advisory* below).

AERIAL DRIFT REDUCTION ADVISORY
This section is advisory in nature and does not supersede the mandatory label requirements.

Application Height: Applications should not be made at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces drift potential.

Swath Adjustment: When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distance should increase, with increasing drift potential (e.g. higher wind).

Wind: Drift potential is lowest between wind speeds of 2 - 10 mph (follow state regulations). However, many factors, including equipment type, determine drift potential at any given speed. Application should be avoided below 2 mph due to variable wind direction and high inversion potential.
Note: Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect drift.

Sensitive Areas: Renovate OTF should only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

AQUATIC WEEDS CONTROLLED BY RENOVATE OTF

alligatorweed	pennywort
American lotus	smartweed
bladderwort	water chestnut†
Eurasian watermilfoil	yellow water lily (*Nuphar spp.*, spatterdock)
milfoil species	white water lily (*Nymphaea* spp.)
parrotfeather††	water primrose (*Ludwigia* spp.)
pickerelweed	watershield (*Brasenia* spp.)

† Not for use in California.
†† Retreatment may be needed to achieve desired level of control.

Application Methods

SURFACE APPLICATION
Use a mechanical spreader such as a fertilizer spreader or mechanical seeder or similar equipment capable of uniformly applying Renovate OTF. Before spreading any product, carefully calibrate the application equipment. When using boats and power equipment, you must determine the proper combination of (1) boat speed (2) rate of delivery from the spreader, and (3) width of swath covered by the granules.

Use the following formula to calibrate the spreader's delivery in pounds of Renovate OTF per minute:

$$\frac{\text{Miles per hour X spreader width (feet) X pounds per acre}}{495} = \text{Pounds per minute}$$

AERIAL APPLICATION (HELICOPTER ONLY)
Ensure uniform application. All equipment should be properly calibrated using blanks with similar physical characteristics to Renovate OTF. To avoid streaked, uneven or overlapped application, use an appropriate tracking device (e.g. GPS). Refer to the *Aerial Drift Reduction Advisory* section of this label for additional precautions and instructions for aerial application.

Floating and Emerged Weeds
For control of water lily's (*Nymphaea* spp. and *Nuphar* spp.), watershield (*Brasenia* spp.), and other susceptible emersed and floating herbaceous weeds, apply 0.75 to 2.5 ppm triclopyr per acre. Apply when plants are actively growing.

Use higher rates in the rate range when plants are mature, when the weed mass is dense, or for difficult to control species. Repeat as necessary to control regrowth, but do not exceed a total of 2.5 ppm triclopyr for the treatment area per annual growing season.

Submersed Weeds
For control of Eurasian watermilfoil (*Myriophyllum spicatum*) and other susceptible submerged weeds in ponds, lakes, reservoirs, impounded rivers, streams and other bodies of water that are quiescent; non-irrigation canals, and seasonal irrigation waters, or ditches that have little or no continuous outflow, apply Renovate OTF using mechanical or portable granule spreading equipment. Rates should be selected according to the rate chart below to provide a triclopyr concentration of 0.75 to 2.5 ppm ae in treated water. Use of higher rates in the rate range is recommended in areas of greater water exchange or when treating target area of 1/2 acre or smaller. These areas may require a repeat application. However, total application of Renovate OTF must not exceed an application rate of 2.5 ppm ae triclopyr for the treatment area per annual growing season.

For optimal control, apply in spring or early summer when Eurasian watermilfoil or other submersed weeds are actively growing.

Concentration of Triclopyr Acid in Water (ppm a.e.)

Avg. Water Depth (ft)	Pounds Renovate OTF / acre (10% a.e.)				
	0.75 ppm	1.0 ppm	1.5 ppm	2.0 ppm	2.5 ppm
1	20	27	41	54	68
2	41	54	81	108	135
3	61	81	122	162	203
4 feet or greater	81	108	164	216	270

Precautions for Potable Water Intakes:
For applications of Renovate OTF to control floating, emersed, and submersed weeds in sites that contain a functioning potable water intake for human consumption, see the chart on the next page to determine the minimum setback distances of the application from the functioning potable water intakes.

Concentration of Triclopyr Acid in Water (ppm a.e.)

Area Treated (acres)	Required Setback Distance (ft) from Potable Water Intake				
	0.75 ppm	1.0 ppm	1.5 ppm	2.0 ppm	2.5 ppm
<4	300	400	600	800	1000
>4 - 8	420	560	840	1120	1400
>8 - 16	600	800	1200	1600	2000
>16 - 32	780	1040	1560	2080	2600
>32 acres, calculate a setback using the formula for the appropriate rate	Setback (ft) = (800*ln (acres) – 160) /3.33	Setback (ft) = (800*ln (acres) – 160) /2.50	Setback (ft) = (800*ln (acres) – 160) /1.67	Setback (ft) = (800*ln (acres) – 160) /1.25	Setback (ft) = (800*ln (acres) – 160)

Note: ln = natural logarithm

Example Calculation 1:

to apply 2.5 ppm Renovate OTF to 50 acres:

Setback in feet = (800 x ln (50 acres) – 160
= (800 x 3.912) – 160
= 2970 feet

Example Calculation 2:

to apply 0.75 ppm Renovate OTF to 50 acres:

$$\text{Setback in feet} = \frac{(800 \times \ln(50 \text{ acres}) - 160}{3.33}$$

$$= \frac{(800 \times 3.912) - 160}{3.33}$$

= 892 feet

Note: Existing potable water intakes which are no longer in use, such as those replaced by potable water wells or connections to a municipal water system, are not considered to be functioning potable water intakes.

To apply Renovate OTF around and within the distances noted above from a functioning potable water intake, the intake must be turned off until the triclopyr level in the intake water is determined to be 0.4 parts per million (ppm) or less by laboratory analysis or immunoassay.

WETLAND SITES

Wetlands include flood plains, deltas, marshes, swamps, bogs, and transitional areas between upland and lowland sites. Wetlands may occur within forests, wildlife habitat restoration and management areas and similar sites as well as areas adjacent to or surrounding domestic water supply reservoirs, lakes and ponds.

For control of emersed, floating or submersed aquatic weeds in wetland sites, follow use directions and application methods associated with the *Floating and Emersed Weeds* or *Submersed Weeds* sections on this label.

Use Precautions

Minimize unintentional application to open water when treating target vegetation in wetland sites.

Note: Consult local public water control authorities before applying this product in and around public water. Permits may be required to treat such areas.

Storage and Disposal

Do not contaminate water, food, or feed by storage and disposal.
Open dumping is prohibited.
Pesticide Storage: Store in original container. Do not store near food or feed. In case of leak or spill, contain material and dispose as waste.
Pesticide Disposal: Wastes resulting from the use of this product must be disposed of on site or at an approved waste disposal facility.
Container Disposal (Plastic): Do not reuse container. Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.
General: Consult federal, state, or local disposal authorities for approved alternative procedures.

Terms and Conditions of Use

If terms of the following Warranty Disclaimer, Inherent Risks of Use, and Limitation of Remedies are not acceptable, return unopened package at once to the seller for a full refund of purchase price paid. Otherwise, use by the buyer or any other user constitutes acceptance of the terms under Warranty Disclaimer, Inherent Risks of Use and Limitations of Remedies.

Warranty Disclaimer

SePRO Corporation warrants that the product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. SEPRO CORPORATION MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

Inherent Risks Of Use

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label such as unfavorable temperatures, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of SePRO Corporation as the seller. To the extent permitted by applicable law all such risks shall be assumed by buyer.

Limitation of Remedies

To the fullest extent permitted by law, SePRO Corporation shall not be liable for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories) shall be limited to, at SePRO Corporation's election, one of the following:

1. Refund of purchase price paid by buyer or user for product bought, or
2. Replacement of amount of product used.

SePRO Corporation shall not be liable for losses or damages resulting from handling or use of this product unless SePRO Corporation is promptly notified of such losses or damages in writing. In no case shall SePRO Corporation be liable for consequential or incidental damages or losses.

The terms of the "Warranty Disclaimer" above and this "Limitation of Remedies" cannot be varied by any written or verbal statements or agreements. No employee or sales agent of SePRO Corporation or the seller is authorized to vary or exceed the terms of the "Warranty Disclaimer" or "Limitations of Remedies" in any manner.

AQUATIC CONTROL

AQUATIC HABITAT MANAGEMENT

cerexagri

AQUATHOL® K

AQUATIC HERBICIDE

ACTIVE INGREDIENT:	
Dipotassium salt of endothall*	40.3%
OTHER INGREDIENTS:	59.7%
TOTAL	100.0%

*7-oxabicyclo [2.2.1]heptane-2,3-dicarboxylic acid equivalent 28.6%
Contains per gallon 4.23 lb. dipotassium endothall

KEEP OUT OF REACH OF CHILDREN

DANGER

FIRST AID:

IF IN EYES:

- Hold eye open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present, after the first 5 minutes then continue rinsing.
- Call a poison control center or doctor for treatment advice.

IF ON SKIN:

- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for treatment advice.

IF INHALED:

- Move person to fresh air. If person is not breathing, call 911 or ambulance, then give artificial respiration, preferably mouth-to-mouth if possible.
- Call a poison control center or doctor for treatment advice.

IF SWALLOWED:

- Call a poison control center or doctor immediately for treatment advice.
- Have person sip a glass of water if able to swallow. Do not induce vomiting unless told by a poison control center or doctor. Do not give anything by mouth to an unconscious person.

HOT LINE NUMBER: Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact (303) 623-5716 for emergency medical treatment information.

NOTE TO PHYSICIAN: Measures against circulatory shock, respiratory depression, and convulsion may be needed.

EPA Registration No. 4581-204 EPA Establishment No. 62171-MS-003

Net Contents _____

Cerexagri, Inc.
630 Freedom Business Center
Suite 402
King of Prussia, PA 19406
1 800-438-6071 • www.cerexagri.com

AQUATIC CONTROL

GENERAL INFORMATION

AQUATHOL K is a liquid concentrate soluble in water which is effective against a broad range of aquatic plants with a margin of safety to fish.

Dosage rates indicated for the application of AQUATHOL K are measured in "Parts Per Million" (ppm) of dipotassium endothall. Only 0.5 to 5.0 ppm are generally required for aquatic weed control, whereas some fish species are tolerant to approximately 100 ppm or over.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

HOW TO APPLY:

AQUATHOL K is a contact herbicide; consequently, do not apply before weeds are present. Application as early as possible after weeds appear and are actively growing is recommended for best results.

If an entire pond is treated at one time, or if the dissolved oxygen level is low at time of application, decay of weeds may remove enough oxygen from the water, causing fish to suffocate. Water containing very heavy vegetation should be treated in sections to prevent suffocation of fish. Sections should be treated 5-7 days apart. Carefully measure size and depth of area to be treated and determine amount of AQUATHOL K to apply from chart.

AQUATHOL K should be sprayed on the water or injected below the water surface and should be distributed as evenly as possible. It may be applied as a concentrate or diluted with water depending on the equipment. Some dilution will give better distribution. For best results apply when water is quiescent and/or flows are minimal.

In instances where the weed(s) to be controlled is an exposed surface problem (i.e., some of the broad-leaved pond weeds) coverage is important. For best results apply the concentrate or with the least amount of water compatible with the application equipment.

Necessary approval and/or permits should be obtained in states where required.

AQUATIC WEEDS CONTROLLED AND DOSAGE RATE CHARTS

AQUATHOL K is recommended for the control of the following aquatic weeds in irrigation and drainage canals, ponds and lakes at the rates indicated. Since the active ingredient is water soluble and tends to diffuse from the treated area, select the dosage rate applicable to the area to be treated. Use the lower rate in each range of rates where the growth is young and growing and/or where the weed stand is not heavy. Marginal treatments of large bodies of water require higher rates as indicated.

AQUATIC CONTROL

Aquatic Weed	RATES Entire Pond/Lake or Large Area Treatment	Gallons per Acre Ft.	Spot or Lake Margin Treatment	Gallons per Acre Ft.
Bur Reed, Sparganium spp.	3.0-4.0 ppm	1.9-2.6 gal.	4.0-5.0 ppm	2.6-3.2 gal.
Coontail, Ceratophyllum spp.	1.0-2.0 ppm	0.6-1.3 gal.	2.0-3.0 ppm	1.3-1.9 gal.
Horned Pondweed, Zannichellia palustris	1.0-2.0 ppm	0.6-1.3 gal.	2.0-3.0 ppm	1.3-1.9 gal.
Hydrilla, Hydrilla verticillata	2.0-3.0 ppm	1.3-1.9 gal.	3.0-4.0 ppm	1.9-2.6 gal.
Hygrophila, Hygrophila polysperma	4.0-5.0 ppm	2.6-3.2 gal.	5.0 ppm	3.2 gal.
Milfoil, Myriophyllum spp.	2.0-3.0 ppm	1.3-1.9 gal.	3.0-4.0 ppm	1.9-2.6 gal.
Naiad, Najas spp.	1.0-3.0 ppm	0.6-1.9 gal.	2.0-4.0 ppm	1.3-2.6 gal.
Pondweed, Potamogeton spp.	0.5-3.0 ppm	0.3-1.9 gal.	1.5-4.0 ppm	1.0-2.6 gal.
Including:				
American, P. nodosus	2.0-3.0 ppm	1.3-1.9 gal.	3.0-4.0 ppm	1.9-2.6 gal.
Largeleaf (Bass Weed), P. amplifolius	2.0-3.0 ppm	1.3-1.9 gal.	3.0-4.0 ppm	1.9-2.6 gal.
Curlyleaf, P. crispus	0.5-1.5 ppm	0.3-1.0 gal.	1.5-3.0 ppm	1.0-1.9 gal.
Flatstem, P. zosteriformis	2.0-3.0 ppm	1.3-1.9 gal.	3.0-4.0 ppm	1.9-2.6 gal.
Floating-leaf, P. natans	1.0-2.0 ppm	0.6-1.3 gal.	2.0-3.0 ppm	1.3-1.9 gal.
Illinois, P. illinoensis	1.5-2.5 ppm	1.0-1.6 gal.	2.5-3.5 ppm	1.6-2.3 gal.
Narrowleaf, P. pusillus	1.0-2.0 ppm	0.6-1.3 gal.	2.0-3.0 ppm	1.3-1.9 gal.
Threadleaf, P. filiformis	2.0-3.0 ppm	1.3-1.9 gal.	3.0-4.0 ppm	1.9-2.6 gal.
Sago, P. pectinatus	1.0-2.0 ppm	0.6-1.3 gal.	2.0-3.0 ppm	1.3-1.9 gal.
Variable Leaf, P. diversifolius	1.0-2.0 ppm	0.6-1.3 gal.	2.0-3.0 ppm	1.3-1.9 gal.
Parrot Feather, Myriophyllum aquaticum	2.0-3.0 ppm	1.3-1.9 gal.	3.0-4.0 ppm	1.9-2.6 gal.
Water Stargrass, Heteranthera spp.	2.0-3.0 ppm	1.3-1.9 gal.	3.0-4.0 ppm	1.9-2.6 gal.

RATE OF APPLICATION — LAKES AND PONDS

The following chart indicates the total quantity of material to be applied.

APPROXIMATE GALLONS OF AQUATHOL K FOR ONE ACRE (208' x 208') TREATMENT

	DOSAGE IN GALLONS FOR VARIOUS CONCENTRATIONS IN PPM						
DEPTH	0.5 ppm	1.0 ppm	1.5 ppm	2.0 ppm	3.0 ppm	4.0 ppm	5.0 ppm
1 ft.	0.3	0.6	1.0	1.3	1.9	2.6	3.2
2 ft.	0.6	1.3	1.9	2.6	3.8	5.1	6.4
4 ft.	1.3	2.6	3.8	5.1	7.7	10.2	12.8
6 ft.	1.9	3.8	5.8	7.6	11.5	15.3	19.2

RATE OF APPLICATION — IRRIGATION AND DRAINAGE CANALS**

The following indicates the total quantity of material to be applied.

GALLONS OF AQUATHOL K REQUIRED TO TREAT 1 MILE OF CANAL 1 FOOT DEEP*

	WIDTH OF CANAL IN FEET			
PPM	5	10	15	20
1.0 ppm	0.4	0.75	1.2	1.5
2.0 ppm	0.75	1.5	2.3	3.0
3.0 ppm	1.2	2.3	3.5	4.5
4.0 ppm	1.5	3.0	4.5	6.0
5.0 ppm	2.0	3.8	5.7	7.5

The minimum contact time with weeds for optimum results should be 2 hours.

*For deeper water, adjust rate accordingly.

** Not for this use in California.

AQUATIC CONTROL

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS (AND DOMESTIC ANIMALS)

DANGER

CORROSIVE. CAUSES IRREVERSIBLE EYE DAMAGE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING. AVOID BREATHING VAPORS OR SPRAY MIST.

Applicators and other handlers must wear:
- Long-sleeved shirt and long pants
- Waterproof gloves
- Shoes plus socks
- Protective eyewear

USER SAFETY RECOMMENDATIONS:

Users should:
- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove protective clothing and equipment immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Avoid contact with or drift to other crops or plants as injury may result. Wash out spray equipment with water after each operation.

Do not use fish from treated areas for food or feed within 3 days of treatment. Do not use water from treated areas for watering livestock, for preparing agricultural sprays for food crops, for irrigation or for domestic purposes within the following periods:

Up to 0.5 ppm dipotassium salt — 7 days after application

Up to 4.25 ppm dipotassium salt — 14 days after application

Up to 5.0 ppm dipotassium salt — 25 days after application

Treated water can be used for sprinkling bent grass immediately.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

Storage Instructions: Store in the original container. Do not store in a manner where cross-contamination with other pesticides, fertilizers, food or feed could occur. Storage at temperatures below 32°F may result in the product freezing or crystallizing. Should this occur the product must be warmed to 50°F or higher and thoroughly agitated. In the event of a spillage during handling or storage, absorb with sand or other inert material and dispose of absorbent in accordance with the Pesticide Disposal Instructions listed below.

Pesticide Disposal Instructions: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container Disposal Instructions: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

EMERGENCY TELEPHONE NUMBERS:

CHEMTREC: (800) 424-9300

MEDICAL: (303) 623-5716 Rocky Mountain Poison Control Center

WARRANTY AND DISCLAIMER

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4581-204(100504-1166) Made and Printed in U.S.A.

AQUATIC CONTROL